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The CALCOMP Preview System enables a user to evaluate the contents of a CALCOMP generated plot file by displaying a similar image on the Tektronix 4014 graphic display terminal.

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USERS MANUAL
for the
CALCOMP PREVIEW SYSTEM
Prepared for the
DEFENSE COMMUNICATIONS ENGINEERING CENTER
Contract No. DCA 100-77-C-0037
Subtask 80-3.1
March 1981

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SECTION 1. GENERAL

1.1 Purpose of the Users Manual. The objective of the Users Manual
for the CALCOMP Preview System (CPS) is to provide the user's non-ADP
personnel with the information necessary to use the system effectively.

This manual assumes that the user has a working knowledge of IBM TSO
or PDP-11 RSX-11M+ procedures and the use of the CALCOMP subroutines
described in reference 1b.

1.2 Project References. The development of the CALCOMP Preview System
was authorized under Subtask 80-3.1, CALCOMP to Tektronix Conversion,
under contract DCA 100-77-C-0037. The following documentation provides
information useful in understanding the system:

    a. CALCOMP Model 7000 PLOTTING SYSTEM Users Manual, DCEC (R830),
       1 Oct 76.

    b. CALCOMP Basic Software, CAL EDIT User's guide, California
       Computer Products, Inc., May 1975.

    c. TERRA PLOT SYSTEM: Users Manual, January, 1975.

1.3 Security and Privacy. The CPS is unclassified, and is subject to
no privacy restrictions. Each user is responsible for observing
security or privacy restrictions applicable to any files plotted through
the system.

SECTION 2. SYSTEM SUMMARY

2.1 <u>System Application</u>. The CPS enables a user to evaluate the contents
of a data tape prepared for the CALCOMP flatbed plotter by displaying
a similar image on the Tektronix graphic display terminal. Representative
uses include:

 . Evaluating a plot file before plotting it on the CALCOMP plotter.

 . Determining an appropriate scaling factor and offset before
   submitting the plot file to the CALCOMP plotter.

 . Obtaining plot images when the CALCOMP plotter is inoperative
   or heavily used.

CPS provides a set of commands to control scaling, rotation, and
positioning of the display on the terminal screen. At any time, the user
may make a copy of the image using the hard copy attachment to the display
terminal. This capability allows the user to access the data on a CALCOMP
plot tape at will, without requiring the support of a plotter operator.

This preliminary review feature enables the user to confirm that the
data is ready for plotting, and thus provides a significant saving
in time and costs.

2.2 <u>System Operation</u>. To evaluate a plot file on an NASC AS/5-3, the
user copies the data to a file which can be accessed by TSO (a disk
file), allocates the file using the DDNAME FT30F001, and executes the
program from a graphic display terminal (See Section 3 for detailed
instructions). On the PDP-11/70 RSX-11+ system, the user can plot a
file on either disk or tape. If the file is on disk, the user can run
the program directly. If the file is on tape, the user mounts the tape
and allocates the tape drive before running the program. In either case,
the user executes the program on a graphic display terminal where the
program prompts for the logical unit number of the plot file. On both
machines, the program prompts the user for commands. When "PLOT" is
commanded, the program places the image on the CRT at the terminal. On

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the NASC AS/5-3, only one file can be plotted per program execution. On the PDP-11/70, the user can plot more than one file by specifying different logical unit numbers to the program prompts.

2.3 System Configuration. The program is designed to run on either an NASC AS/5-3 CPU, operating under MV5, or a PDP-11/70 operating under RSX-11M+ with at least one Tektronix 4014 graphic display terminal attached to the system. The terminal is the input device for commands and the output device for system responses and graphic output. On the NASC, the plot file must be placed on a disk device for access under TSO, while on the PDP-11/70, the plot file may be on tape or on a disk device.

2.4 System Organization. The CPS consists of one program, which processes plot files provided by the user. On the NASC, the system utility IEBGENER is used for moving plot files to disk. See Figure 3-01 for an example of the JCL required to execute IEBGENER.

2.5 Performance. On the NASC AS/5-3, the size of the plot file that can be accommodated is limited by the CPU time permitted in a single TSO session (as of this writing, 5 minutes CPU time). On the PDP-11/70, there is no limit to the length of time available for a plotting session. A plot of the map of Western Europe, shown in Figure 2-01, contained 2249 CALCOMP sentences and was plotted in 37 seconds of CPU time on the NASC system.

2.6 General Description of Input, Processing, Outputs.

    a. Inputs:
        (1) Plot file. This must contain CALCOMP sentences produced in conformity with the proprietary software of CALCOMP and the standards of reference 1.2b.
        (2) Commands: On both the NASC TSO and on the PDP-11/70, the user enters commands from the terminal. It is possible to run the program in batch on the NASC, and take commands from an input file. In such a case, only the 'DUMP' command (See paragraph 3.2e) is valid.

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b. <u>Processing</u>: The program is initialized, and plot parameters
are established, through the control commands. A plot file
is accessed when the command 'PLOT' or the command 'DUMP' is
entered. At that time, the program opens the plot file, reads
the records in, and separates the CALCOMP sentences. If the
command 'PLOT' is in effect, the program places the graphic
display on the CRT screen, subject to all control parameters
that may have been established deliberately or by default.
If the command 'DUMP' is in effect, the program lists each
CALCOMP sentence on the selected device (normally a printer or
terminal). At end-of-file, the program reverts to the prompt
mode and resumes accepting commands.

When the program begins execution, or when the parameters are
reset using the 'FULLSCREEN' or 'NOWINDOW' commands, the
scaling is set so that the vertical extent of the plotting
area on the CRT face corresponds to the entire vertical extent
of the CALCOMP plotter bed. This scaling may be unsuitable
for small drawings; therefore, after each plot, the scaling
parameters are adjusted so that the file, if replotted, would
be displayed optimally. See Figure 3-05, pages 3 and 4.
That is, the picture size is adjusted to the largest that will
fit inside the borders of the display, without losing any part.
A user who knows the dimensions of the drawing beforehand can save
time by using the 'WINDOW' command to control the scaling. To
stop the run, the user enters the command 'END'.
Note: The 'DUMP' command is only useful to a user who has
      knowledge of the structure and meaning of the CALCOMP
      sentences. These are described in reference 1.2b.

c. <u>Outputs</u>: The system produces two types of outputs: graphic
text, and dump.
(1) Graphic output is produced on file FT06F001 on the NASC
    and produced on logical unit 16 on the PDP-11/70, and must

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be directed to a Tektronix graphic display terminal to
be of value. It consists solely of the signals needed
to drive the display terminal, and is produced in response
to the command 'PLOT'.

(2) Text output is produced on the file FT06F001 on the NASC
and to logical unit 6 on the PDP-11, and may be directed
to a display terminal or to the line printer. It contains
all program prompting messages, and informational
messages.

(3) Dump output is produced on the file FT08F001 on the
NASC and to logical unit 8 on the PDP-11 and may be
directed to the line printer or to a display terminal.
It contains the listing of CALCOMP sentences produced in
response to the command 'DUMP'.

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FIGURE 2-01: Map of Western Europe

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SECTION 3. STAFF FUNCTIONS RELATED TO TECHNICAL OPERATIONS

3.1 Initiation Procedures.

    a. NASC AS/5-3 TSO. Using a Tektronix 4014-1 graphics terminal:

        (1) LOGON to TSO by typing in: LOGON USERID A(Account Number)

        (2) If the selected plot file is not on disk, you must run
             IEBGENER to copy a CALCOMP tape file to disk, so that
             it can be accessed via TSO. See Figure 3-01 for an
             example. The data set name specified in SYSUT1 must be an
             existing data set on tape and the volume serial number
             must be the six digit serial number of the tape. Note,
             this example assumes the creation of a new data set on
             disk. Thus, the data set name specified in SYSUT2 may
             not exist. This job must end with a condition code
             of 0000 for a valid CALCOMP file on disk to be created.
             A typical abnormal termination code is SB37 which means
             that not enough space was allocated. To remedy this problem,
             delete the data set created by SYSUT2, change the SPACE
             parameter in SYSUT2 to request more space, and resubmit.

        (3) Retrieve the CLIST for running the CALCOMP Preview
             Program from R831.LIBRARY by typing in:

                  LBG SCOPE DS('R831.LIBRARY') CLIST RON

             This command creates a data set named userid.SCOPE.CLIST.
             See Figure 3-02 for listing of the CLIST SCOPE.

        (4) Run the CALCOMP Preview program using the CLIST SCOPE.
             SCOPE requires the entry of one parameter: the full
             data set name of the file to be plotted. Suppose the
             file you wish to plot is M9033.MAP.DATA. Then type
             in:

                  EXEC SCOPE 'M9033.MAP.DATA'   .

             If a parameter is omitted, SCOPE prompts for a file name.
             (Enter Positional Parameter-File.) After running the

CALCOMP Preview Program, the CLIST asks if a file dump is to be printed. Type in "YES" or "NO". If "YES", the CLIST prompts for your last name and prints the file dump via the PRINT command.

b. NASC AS/5 Batch. Run CPS as a normal batch job to list the CALCOMP sentences contained in a plot file. JCL for a representative job step to dump a plot file is contained in Figure 3-03. The plot file in the example is "M9033.CRTHUM.DATA".

c. PDP-11/70. Using a Tektronix 4014-1 graphics terminal:
   (1) LOGIN to the system by typing in LOGIN. The system prompts for the userid (ID?) and the password (PASSWORD?).
   (2) If the file to be plotted is a tape file, mount tape on tape drive (See tape mount instructions on inside cover of tape drive) and allocate the tape drive.
   (3) Run the program by typing in: RUN [50,55]CLTOTK. See Appendix B, page B-03, for an example.

3.2 Staff Input Requirements. The CPS is used whenever a user needs to obtain a plot from a CALCOMP file without using the plotter directly, or when a listing of the CALCOMP sentences is required.

a. On the NASC AS/5, the file to be plotted through TSO must be on a disk device. If the required file is on tape, use the standard utility IEBGENER to copy it to a disk file. See Figure 3-01 for JCL for a representative job step to do this.

b. On the PDP-11/70, the file to be plotted can either be a tape file or a disk file. The file name must be of the form FILEnn.DAT where nn is the logical unit number. This file is created by writing a program which creates a file of CALCOMP sentences for the desired plot. Reference 1.2a, pages 22 - 25, lists examples of PL/1 and FORTRAN programs. On the PDP-11/70, a FORTRAN program must be written, link edited, and run in order to create a file to be input to the CALCOMP Preview System.

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3.2.1 How To Use The Program. To gain the most benefit from this system, the user should understand how the CALCOMP plotter works, how the CPS provides comparable capabilities, and how the user can exploit these capabilities to obtain desired images or information.

The CALCOMP plotter is a mechanical device, driven by a minicomputer that reads files from a tape prepared elsewhere, and draws pictures as commanded by the data in the plot file. The pictures are drawn on pieces of paper or plastic (mylar) placed on the plotter bed, a large flat surface which measures 48 by 82 inches. An operator controls the machine by entering commands through a teletype console. In addition, the operator controls the drawing by manually moving the plotter pen to a desired position when the plotter is halted. Then, when the operator commands the plotter to resume operation, the plotting continues from the location of the pen. This is called a mechanical reorigin of the plot. It allows the operator to position the drawings on the paper at will, to draw on clean paper, and to insure that the pen movement stays in the plotter bed, and does not bump into the stops at the edge of the plotter bed.

A plot file, which is the input to the plotter, is produced by an application program written to create the picture needed. It contains data of three kinds:

- Control commands.
- Graphics data.
- Operator messages.

Control commands initiate the plot, select the pen, halt the plot, and cause the origin of the plotter's coordinate system to be moved to the present location of the pen. Selection of different pens allows the plotted image to be in different colors. There are two kinds of halts: temporary and final. The programmer may place a temporary halt anywhere in the file, to allow the operator to intervene in the plot. The

most common temporary halt is one made immediately after initiating
the plot, which allows the operator to place the pen at a desired spot
on the plotter bed, so that spot will be the origin of coordinates
for the plot, because the temporary halt is accompanied by a command
to reset the origin of coordinates. A final halt is placed at the end
of the drawing.

Graphics data tells the plotter where to draw or move the pen. The
data is presented in terms of horizontal (X) and vertical (Y) coordinates,
and commands which specify straight line drawing, circles, curve fits,
and the like. It may also contain character data which is drawn on
the plot, such as labels and names.

Operator messages are included in the plot file as character strings, just
like other character data, but they are produced on the plotter console,
not on the plotted image. Normally, an operator message gives the operator
information about intervention that is required, so it is accompanied by
a temporary halt.

All of the contents of the plot file are described in reference 1.2b,
which also describes the proprietary subroutines that one calls to cause
the plot file to be written.

The Tektronix graphic display terminal used with this program contains
a cathode-ray tube display, a keyboard for entering data, and several
control switches. It has two modes of operation: character and
graphics. In the character mode, it accepts input from the keyboard
and displays data lines on its screen. In the graphics mode, it
accepts signals from a computer that cause it to draw lines or move its
beam position on the screen. It can also accept, as input, data from
a "screen cursor", which is a display that looks like crosshairs - a
horizontal line and a vertical line. These are two wheels on the
terminal keyboard which one uses to move the intersection of the lines.
Roll one wheel to move the horizontal line up and down - roll the

other to move the vertical line from side to side. This screen cursor
is intended to allow the user to designate places on the display screen
by positioning the cursor and entering one character of data.

Unlike some other CRT display terminals, the Tektronix graphic
terminal retains all data written on it until the terminal is reset.
That is, graphic images and character data stay on the display; when the
writing space is filled with data lines, the display position is returned
to the top of the screen, and shifted between the left and right hand
halves of the screen. This process continues, with any new data being
written over the top of all data, until the display is reset. There
are two ways to reset the display: the user may press the reset key
on the terminal keyboard, or the computer driving the display may
transmit a reset signal when so commanded by a program. In either case,
the effect the user sees is the same; there is a bright flash of light
on the display screen, the old display disappears, and new data is
presented, starting in the upper left corner of the screen.

The basic function of the CPS program is to read a CALCOMP plot file
and interpret its commands by drawing a similar image on the CRT
display screen. Since the display screen is small, it is necessary
to magnify and position the image suitably to make it useful. The
commands provided in the program are designed to allow the user complete
control of the plotted image, and to do so in a fashion which can be
applied directly to the control of the CALCOMP plotter. Paragraph 3.2.2
gives details of the available commands; the following are general
instructions on how to use the commands.

The quickest way to get the desired image is to use the "WINDOW"
command to specify the lower left corner and upper right corner of the
plot area. These coordinates are specified in inches, exactly as they
would be on the CALCOMP plotter. The difference is that on the CPS
the specified area is "blown up" to fit the CRT screen's plotting

area (See Figure 3-05) while on the CALCOMP plotter the size is the same, only the limits of the plot are affected. The user may enter the WINDOW command and the bounding coordinates immediately after starting the program, before the "PLOT" command.

The "REORIGIN" and "ROTATE" commands are provided mainly for completeness, to parallel the same facilities of the CALCOMP plotter. Most users will have no need for these facilities.

The program provides automatic rescaling after every plot to aid the user who has no prior information about the contents of a plot file. If no other control information is entered, the program first plots the entire plotter bed on the scope face, and then, after plotting the image once, readjusts the scaling to plot the picture as large as possible without losing any part of the image, when it is plotted again. The program does this after _every_ _plot_, so that the second plot of any file, without any other intervention, will be ideally scaled and positioned for the whole image. Using this method means that the file must be plotted twice, however, which may be time consuming. The use of the "WINDOW" command from the start is more desirable, if the necessary information is known. Normally, a user who writes a program or uses another graphics system (e.g., TERRA PLOT, Reference 1.2c) to create a plot file should have that information available.

The "BOX" command is provided to allow a user to "zoom in" on a part of a plotted image by specifying the limits of the next plot directly on the screen, by using the screen cursor. This requires that the file be plotted first. Once the file has been plotted, the user positions the screen cursor twice, designating any two corners of the next plotted image by numbers, 1 through 4, corresponding to the four corners of the CRT screen, counterclockwise from lower left. See Figure 3-05, page 5. Since the CRT face does not move, this means that the resulting image may be tilted compared to the previous plot, to make best use of the CRT screen. Again, this is a specialized capability that may be valuable to only a few users.

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3.2.2 Overview of Commands. As previously indicated, the system responds to commands which the user enters through the graphics terminal. These commands fall naturally into three groups: immediate action commands, plot control commands, and program option commands. Each command is explained in detail in paragraph 3.2.3.

    a.   Immediate action commands are those which cause the program to do something at once. They are:

            PLOT, DUMP, HELP (or ?) and END

Command	Function	Paragraph
PLOT	Start or resume a plot on the graphics terminal.	3.2.3a
DUMP	List CALCOMP sentences from a plot file.	3.2.3b
HELP	Obtain assistance online.	3.2.3c
?	Same as HELP.	3.2.3c
END	Stop the run.	3.2.3f

    b.   Plot control commands are those which affect only the next image plotted. They may be entered any time the program prompts with 'COMMAND?'. There is a mild exception in the 'REORIGIN' graphic data, which is entered during a plot, to reposition the remainder of the plot. Once one of these commands is entered, it overrides any scaling and positioning data established by default, by automatic rescaling from a previous plot, or by another such command previously entered.

Command	Function	Paragraph
WINDOW	Specifies the boundaries of the plot directly.	3.2.3h
SCALE	Specifies the magnification factor to be applied to the next plot.	3.2.3k
ROTATE	Rotates the next plot about the origin.	3.2.3l
BOX	Use screen cursor to designate area for next plot.	3.2.3m
REORIGIN	Specifies a new location for the origin directly on the CRT screen.	3.2.3g

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c. Program option commands govern all plots. Each of them is, in effect, a switch, which causes the program to function one way or another, as the user chooses. Since they have the effect of switches, they are grouped naturally into sets, depending on what program feature they control. When the program starts execution, each one is in a default state. When the user enters one of the commands, the program is set to the indicated state, <u>and remains in that state until the user cancels it by the opposite command</u>. The correspondence is illustrated below:

<u>Default Option</u>	<u>User-Selectable Option(s)</u>
FAST	EXACT
NOHALT	HALT/REORIGIN
NOFRAME	FRAME
NOWINDOW	FULLSCREEN

Note that the REORIGIN command is selected as an option, but that it is used during a plot.

<u>Command</u>	<u>Function</u>	<u>Paragraph</u>
FRAME	Draw a frame around the plot.	3.2.3 n
NOFRAME	Cancel FRAME.	3.2.3 o
FAST	Approximate circles and curves by polygons - saves time.	3.2.3 p
EXACT	Plot circles and curves as well as possible.	3.2.3 q
HALT	Cause plot to be suspended at each temporary halt encountered.	3.2.3 d
NOHALT	Cancel effect of HALT and REORIGIN commands.	3.2.3 e
REORIGIN	Use screen cursor to control location of origin on screen.	3.2.3 g
NOWINDOW	Cancels the FULLSCREEN command, and resets scaling to the default.	3.2.3 i
FULLSCREEN	Causes the program to use the entire screen as its plotting area, not reserving space for messages. Resets scaling to default.	3.2.3 j

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3.2.3 Commands.   The following subparagraphs describe each command
in detail.

    a. 'PLOT': This command is used to start or resume plotting the
                      contents of a plot file. The format is PLOT.
                      The program plots the file from its beginning after
                      clearing the screen. If the file is being plotted
                      for the first time, without any options, the program
                      plots the entire plotter bed on the scope face. See
                      Figure 3-05, page 3. This generally results in a very
                      small image in the lower left hand corner of the
                      screen. If the user enters "PLOT" again, the program
                      readjusts the scaling so that it can plot the picture
                      as large as possible without losing any of the image.
                      See pages A-03 - A-04 in Appendix A for an example of the
                      "PLOT" command entered twice without any intervening
                      commands. The plot resulting from "PLOT" is subject to
                      the plot control commands described in Section 3.2.2b
                      and the program option commands described in Section 3.2.2c.
                      See the descriptions of each commands for the actual
                      results. These commands are described in paragraphs d
                      through q below.

    b. 'DUMP': This command is used to list the contents of the plot
                      file on the device allocated to FT08F001 on the NASC
                      or the line printer on the PDP-11/70. The file is printed
                      one sentence to a line, straight through from start
                      to finish. See CAL EDIT User's guide (Reference 1.2b)
                      for a description of codes used in the CALCOMP
                      sentences.

    c. 'HELP': This command allows the user to get information about
                      the program during execution. The format is 'HELP', 'HELP
                      commandname' or '? commandname', where commandname

is optional. If used, commandname should be one of the commands described above, to obtain useful output. If it is omitted or erroneous, the program provides a list of the commands available. See Figure 3-06 for examples on how to use HELP.

d. 'HALT': This command causes the plotting to be suspended whenever a temporary halt code (M1) is encountered in the plot file. Temporary halts generally occur when the CALCOMP file contains an operator message or when the pen is to be moved. When the plot is suspended, the screen cursor is displayed, and control is returned to the graphic terminal. To resume the plot, position the screen cursor using the horizontal and vertical thumbwheels, (if needed) and enter a character. See WARNING at the end of this paragraph. The character that the user enters determines the action of the program, as follows:

'P' or 'p' transfers control to the command level; the program displays 'COMMAND?', and accepts commands until 'PLOT' or 'DUMP' is entered.

'.' terminates the plot, and transfers control to the command level.

Any other character, even blank or a null character, causes the plotting to continue.

Note: If 'REORIGIN' has been specified, the location of the screen cursor, when the character is entered, becomes the origin of coordinates for the remainder of the plot. In other words, the remainder of the plot is relocated using the screen cursor as the origin instead of the original origin.

e. 'NOHALT': This cancels the effect of the 'HALT' and 'REORIGIN' commands. That is, the program ignores any temporary halt codes that are encountered in the plot file, and, therefore, it is not possible to move the origin of coordinates during a plot. The result is a faster plotting time. If 'NOHALT' has been selected, deliberately or by default, there are still two occasions that cause the plot to halt and display the screen cursor, as follows:

   (1) When the file reaches a final halt (M2) code, the program halts and displays the screen cursor. At this point, the NASC user should move the screen cursor to a position outside the plot, because it controls the level where the next program messages will appear. See the WARNING at the end of this paragraph.

   (2) When an operator message is encountered, within a CALCOMP sentence, the program displays it below the normal plot area (See Figure 3-05, page 2) and then displays the screen cursor. The character entered after the halt controls the actions of the program in the same manner as is described under the 'HALT' command.

f. 'END': This command causes the program to terminate normally.

g. 'REORIGIN': This command causes the program to suspend plotting and display the screen cursor when it encounters a temporary halt code in the plot file. The user then enters a character to continue processing. See the WARNING at the end of this paragraph. The character entered determines the action of the program, as described in paragraph d above. In addition, however, the position of the screen cursor when the

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character is entered becomes the origin of coordinates for the subsequent plotting. This enables the user to see the plot in a different part of the screen. This capability is useful when displaying a plot that is either rotated, scaled, or which normally prints on either the left side or bottom half of the screen. See page A-17 in Appendix A for an example of a plot that is reorigined. This example is rotated.

Note: To use this command effectively, the user must know where and why each temporary halt code is used. The 'DUMP' command (paragraph b above) allows the user to inspect the contents of the plot file and locate the temporary halt codes. See the WARNING at the end of this paragraph.

h.   'WINDOW': This command allows the user to specify the boundaries of the plot in exactly the same manner that it is specified to the CALCOMP plotter. After the command 'WINDOW' is entered, the program prompts for four values, which are all coordinates, in inches, as follows:

Prompt	Required Entry
X1 = ?	X coordinate of lower left corner.
Y1 = ?	Y coordinate of lower left corner.
X2 = ?	X coordinate of upper right corner.
Y2 = ?	Y coordinate of upper right corner.

A user who writes a program or uses a graphics system to create a CALCOMP file should have information on the coordinates available. A user who does not know the actual coordinates can obtain them through

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use of the "FRAME" command followed by the "PLOT"
command. In this case, it is necessary to enter these
instructions only after the file has been plotted at
least once since otherwise the program will not have
accumulated the data needed to compute these values.
If a user enters invalid data, the program prints a
message, and repeats the prompt until the user enters
useable data. Invalid data includes the following:
non-numeric coordinates, X1 and X2 equal, or Y1 and
Y2 equal. After the fourth parameter has been
entered, the program prompts with 'COMMAND?", and
is ready to plot a file. The command alters the
proportions of the plot area to the proportions implied
by the coordinates. If the default proportions are
in effect, then the size of the plot is governed by
the vertical dimension in first priority -- that is,
the plot never extends down into the space reserved for
operator messages at the bottom of the screen. If
'FULLSCREEN' (See paragraph j below) is in effect, the
plot will be scaled to use the full vertical extent
of the screen, and operator messages may overwrite
part of the plot. See pages A-34 - A-39 in Appendix A
and Figure 3-07 for an example of the "WINDOW" command.
Note: The lower left hand corner is X1, Y1, the
upper left hand corner is X1, Y2, the upper
right hand corner is X2, Y2, and the lower
right hand corner is X2, Y1.

i. 'NOWINDOW': This command cancels the 'WINDOW' and 'FULLSCREEN'
command, and returns the scaling to default. That is,
the plot area of the screen is scaled to the proportions
and dimensions of the CALCOMP plotter bed.

j. 'FULLSCREEN': This command causes the plot routines to use the
entire vertical extent of the terminal screen for

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plotting, without reserving space for operator messages. This allows a greater magnification for a plot. However, if the file contains any operator messages they will overwrite part of the plot. See page A-21 in Appendix A for a plot resulting from FULLSCREEN. Note: Without any other options, the file will not be plotted optimally with the FULLSCREEN option until the second plot.

k. 'SCALE': This command specifies the magnification factor to be applied to the next plot. The format is SCALE magfactor, where magfactor represents a scaling factor, expressed as an integer or mixed decimal number. For example, 'SCALE 4.9' is acceptable. The scale factor is applied to the default scaling, as follows: With default scaling, the vertical extent of the plot area represents 48 inches on the CALCOMP bed, and the horizontal extent represents 82 inches. When a scale factor is entered, the scaling is modified so that the extents are divided by the scale factor. Thus, a scale factor of 4 would cause the vertical extent to represent 12 inches, and the horizontal extent to represent 20.5 inches. Since the actual size of the plot area does not change, the effect is the same as making the plotted image 4 times larger than the default size.

Note: The program performs automatic scaling after each plot, adjusting the scale factors so that if the same file is plotted again, it will be displayed optimally. That is, the scale is adjusted so that the longest horizontal or vertical extent of the plot just fits in the plot area, while the other extent does not plot outside the plot area. The automatic rescaling thus cancels any previously entered SCALE command.

1. '<u>ROTATE</u>': This command is used to rotate either a plot or a specified window about the origin of coordinates. The format is 'ROTATE angle', where angle is the desired angle of rotation, expressed in degrees. A positive value causes counter-clockwise rotation. For example, ROTATE 45 results in a plot tilted 45 degrees to the left of its normal position and ROTATE-45 results in a plot tilted 45 degrees to the right of its normal position.

If a 'WINDOW' command is entered after 'ROTATE', the rotation is applied to the window specified. If no 'WINDOW' command is entered, or if the 'WINDOW' command is entered before the 'ROTATE' command, the rotation is applied to the plotted image. Therefore, the sequence

<pre>
          'WINDOW'
          'ROTATE theta'
        is equivalent to
          'ROTATE - theta'
          'WINDOW'
</pre>

Rotation is reset to zero after each plot. See page A-17 in Appendix A for a plot resulting from ROTATE.

m. '<u>BOX</u>': This command is used after a plot is completed to specify boundaries for the next plot directly on the image, using the screen cursor. At the completion of the command, the program draws the boundaries of the area to be plotted on the existing plot and returns to the command mode. The four corners of the plot area are designated as follows:

Corner	Position
1	Lower left
2	Upper left
3	Upper right
4	Lower right

To use 'BOX', select two points which are to be mapped
to corners on the next plot, and enter the command.
The screen cursor will appear three times.

(1) When it appears the first time, move the screen
     cursor crosshairs to one of the desired points,
     enter the number of the corresponding corner, as
     a single digit, 1 through 4.

(2) When the screen cursor reappears, move it to the
     other point, enter the number of the corresponding
     corner.

(3) The program will now draw the computed boundaries
     on the plot, and display the cursor once more. Move
     the vertical crosshair to a suitable location for
     printed output, and enter any character. The program
     will return to the command mode and prompt 'COMMAND?".

If the 'BOX' command detects invalid data, it prompts
with 'INVALID REPLY' and displays the cursor again.
Invalid data includes numeric data greater than 4 or less
than 1 or repetition of coordinates. See Appendix A
for an example of how to use BOX, the resulting plot,
and the resulting plot of the boxed area. The boxed
area is a rectangle similar to the plot area on the
terminal.

n. 'FRAME': This command turns on a switch that causes the plot
     program to draw a rectangle around the boundary of the
     plot whenever the "PLOT" command is entered, thus framing
     the plot. When plotting with the FRAME option, the
     program first displays an empty frame. Under the frame

the program displays the coordinates (for the WINDOW
command) that would produce this plot and the scale
factor in effect. It then tells the user to enter RETURN
to continue plotting. The program then halts and displays
the screen cursor. When RETURN is pressed, the plot
continues. The program clears the screen, draws the
frame once more, and draws the picture inside the frame.
'FRAME' remains in effect until it is cancelled. See
pages A-29 - A-33 in Appendix A for an example of the
'FRAME' command.

Note: If any non-zero rotation has been specified, the
'WINDOW' information that is displayed is not
valid.

o. '<u>NOFRAME</u>': This command cancels the effect of the 'FRAME' command,
and is the default.

p. '<u>FAST</u>': This command causes the program to approximate curves by
line segments. This can greatly speed plotting, at the
cost of precision. This command is the default; it remains
in effect until cancelled by 'EXACT'. (See subparagraph q,
below.) See page A-43 in Appendix B for an example
of how a file is plotted with the FAST option (i.e.,
the default).

q. '<u>EXACT</u>': This command causes the program to plot curves as
closely as possible. This involves much more computation,
so the plot proceeds more slowly. This command remains
in effect until cancelled by 'FAST'. (See subparagraph p,
above.) See pages A-43 - A-45 in Appendix A for an
example on how to use the EXACT command.

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WARNING: The screen cursor behaves differently on the NASC AS/5-3 and the PDP-11/70.

a. On the NASC system, to enter a character, press the key for the character and then press the 'RETURN' key.

On the PDP system, to enter a character, press the key for the character. Do not press 'RETURN'. If you do, it will be interpreted as a second character and probably result in invalid data being entered.

b. On the NASC system, the location of the horizontal line used to designate vertical position determines where text output will appear on the screen. On the PDP, it does not.

c. On both systems, you may respond to the screen cursor by pressing 'RETURN' with no character. This causes coordinate data of (0,0) to be input to the program. (0,0) indicates that the cursor is at the lower left corner of the CRT screen, regardless of its true location. Any program actions that depend on this location will therefore be incorrect. For this reason, it is necessary to input a character whenever the screen cursor is used to designate a location.

3.3 Output Requirements.

a. Graphic outputs. Graphic outputs must be directed to a Tektronix graphic terminal to be useful. Illustrative outputs are shown in Appendix A and Appendix B. Appendix A shows how to initiate the program on the NASC and the results of most commands. Appendix B shows how to initiate the program on the PDP-11/70 and some example plots.

b. Printed output. See Figure 3-04.

3.4 Utilization of System Outputs.
The purpose of the CPS is to display the contents of CALCOMP plot files. This display may be used

for any authorized purpose to which the CALCOMP plot file applies. Representatives uses include:

- Evaluating a plot file before plotting it on the CALCOMP plotter.

- Determine an appropriate scaling factor and offset before submitting the plot file to the CALCOMP plotter.

- Obtaining plot images when the CALCOMP plotter is inoperative or heavily used.

3.5 Recovery and Error Correction Procedures. If an error or failure occurs while running this system, correct the cause of the error and rerun the job.

```
 1000 //M9033SRT JOB (1092206A,,059,,100),TAMBERRINO,MSGCLASS=Q,
 2000 //   NOTIFY=M9033
 3000 /*MESSAGE    USES TAPE 1628
 4000 //STEP1   EXEC PGM=IEBGENER,REGION=100K
 5000 //SYSPRINT   DD SYSOUT=A
 6000 //SYSUT1   DD DSN=UR2235.CPY2.DATA004,UNIT=TAPE9,DISP=(OLD,KEEP),
 7000 //     DCB=(LRECL=364,RECFM=VS,BLKSIZE=368,DEN=2),
 8000 //     VOL=SER=001628
 9000 //SYSUT2   DD DSN=M9033.CPY204.DATA,UNIT=SYSTS,DISP=(,CATLG),
10000 //   DCB=(LRECL=364,RECFM=VS,BLKSIZE=368),
11000 //     SPACE=(CYL,(10,1),RLSE)
12000 //SYSIN   DD DUMMY
13000 /*
```

FIGURE 3-01: JCL to Transfer a Plot File to Disk

```
01000 PROC 1 FILE
02000 FRA
03000 FILESTAT SCOPE.OUTLIST
04000 IF LASTCC NE 0 THEN DO
05000    FREE ATTRLIST(A)
06000    ATTRIB A RECFM(V B S A) LRECL(137)
07000    ALLOC DA(SCOPE.OUTLIST) SPACE(60 3) TRACKS USING(A)
08000    END
09000 ALLOC FI(FT08F001) DA(SCOPE.OUTLIST) OLD
10000 ALLOC FI(FT30F001) DA('&FILE.')  SHR
11000 ALLOC FI(FT06F001) DA(*)
12000 ALLOC FI(FT05F001) DA(*)
13000 CALL 'SYS9.DCAFORT.LINKLIB(TEKTRONX)'
14000 WRITE DO YOU WISH TO PRINT A FILE DUMP?--ENTER YES OR NO.
15000 READ RES
16000 IF &RES. EQ YES THEN DO
17000    WRITE ENTER YOUR LAST NAME
18000    READ LASTNAM
19000    FREE DA(SCOPE.OUTLIST)
20000    P SCOPE.OUTLIST &LASTNAM. CLASS(U)
21000    END
22000 ELSE DO
23000    DELETE SCOPE.OUTLIST
24000    END
25000 FRA
```

FIGURE 3-02: Listing of CLIST SCOPE

```
1.      //M9033RUN JOB (1092206A,PRC,60,20,200),TAMBERRINO,
2.      // NOTIFY=M9033,MSGCLASS=Q
3.      //GO EXEC PGM=TEKTRONX,REGION=250K
4.      //STEPLIB DD DSN=SYS9.DCAFORT.LINKLIB,DISP=SHR
5.      //FT06F001 DD SYSOUT=A
6.      //FT08F001 DD SYSOUT=A
7.      //FT30F001 DD DSN=M9033.CRTHUM.DATA,DISP=SHR
8.      //FT05F001 DD *
9.       DUMP
10.      END
11.      /*
```

FIGURE 3-03: JCL to Run the CPS in Batch

```
CALCOMP PREVIEW PROGRAM.
FOR MORE INFORMATION,REPLY '?' OR 'HELP.'
COMMAND?
DUMP
G50D1.
G1D2XY.
N1T1.
N2G1D2X101600Y101600.
N3T1G25XYN1.
N4T2.
N5.
N6G1D2X-10160Y.
N7G2D1I-40640JXY.
N8G1D2X-30480Y.
N9G2D1I-20320JX-71120Y.
N10G1D2X10160Y.
N11G3D1I40640JXY.
N12G1D2X71120Y-20320.
N13G3D1I-20320JX30480Y-20320.
N14G1D2X-76200Y86360.
N15EF.
N16D5080FG53! !.
N17G1D2X-66040Y86360.
N18G53!!!.
N19G1D2X-55880Y86360.
N20G53!"!.
N21G1D2X-45720Y86360.
N22G53!#!.
N23G1D2X-35560Y86360.
N24G53!$!.
N25G1D2X-25400Y86360.
N26G53!%!.
N27G1D2X-15240Y86360.
N28G53!&!.
N29G1D2X-5080Y86360.
N30G53!'!.
N31G1D2X5080Y86360.
N32G53!(!.
N33G1D2X15240Y86360.
N34G53!)!.
N35G1D2X25400Y86360.
N36G53!*!.
N37G1D2X35560Y86360.
N38G53!+!.
N39G1D2X45720Y86360.
N40G53!,!.
N41G1D2X55880Y86360.
N42G53!-!.
N43G1D2X66040Y86360.
N44G53!.!.
N45G1D2X76200Y86360.
```

FIGURE 3-04: Output Produced by the "DUMP" Command

CRT Face

FIGURE 3-05: Graphic Relationships

(Page 1 of 6)

Part used for Plotting
when 'NOWINDOW' is in effect

4014-1
TEKTRONIX

Part reserved for operator
messages when 'NOWINDOW'
is in effect

Part used for plotting
when 'FULLSCREEN' is
in effect
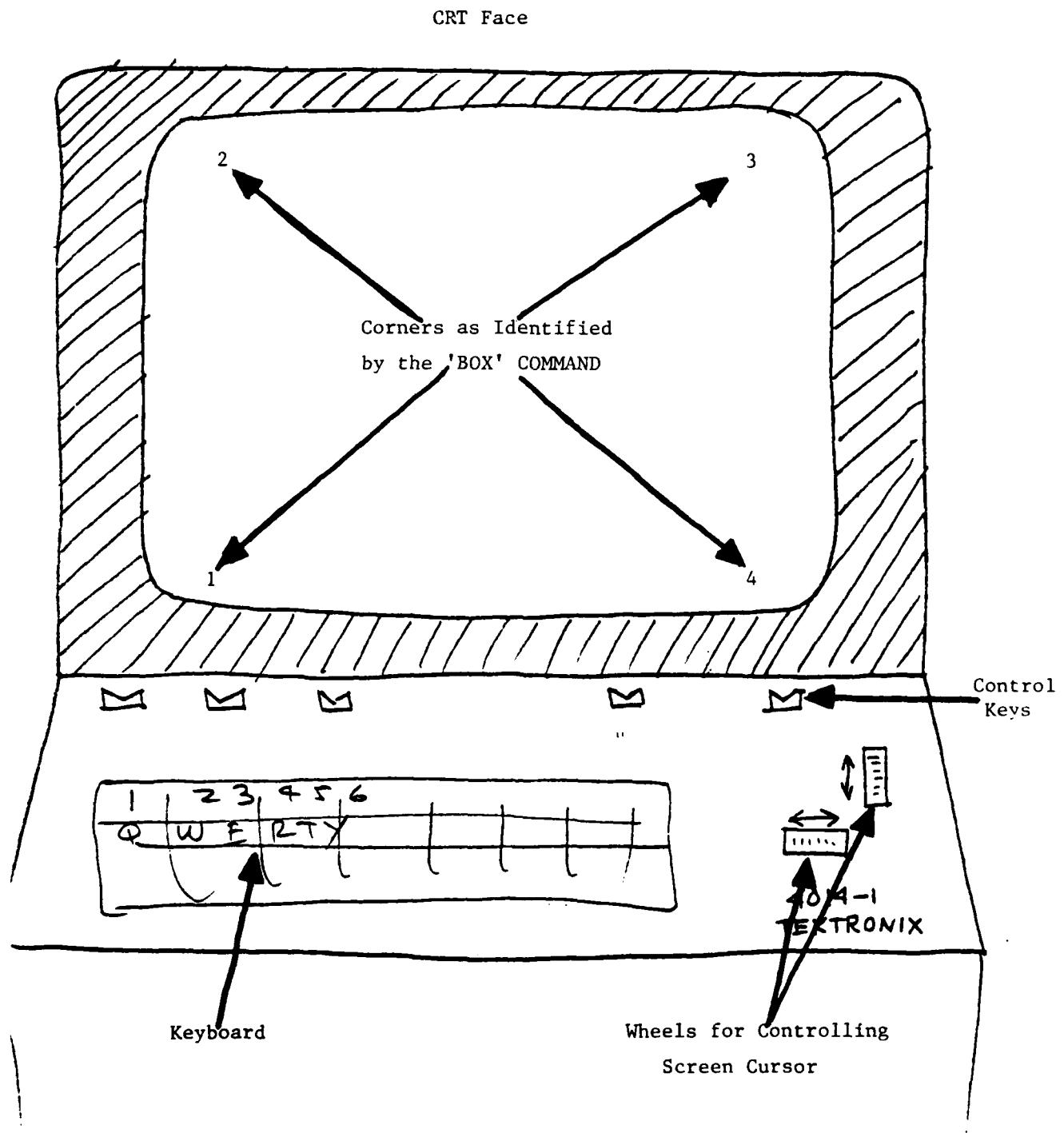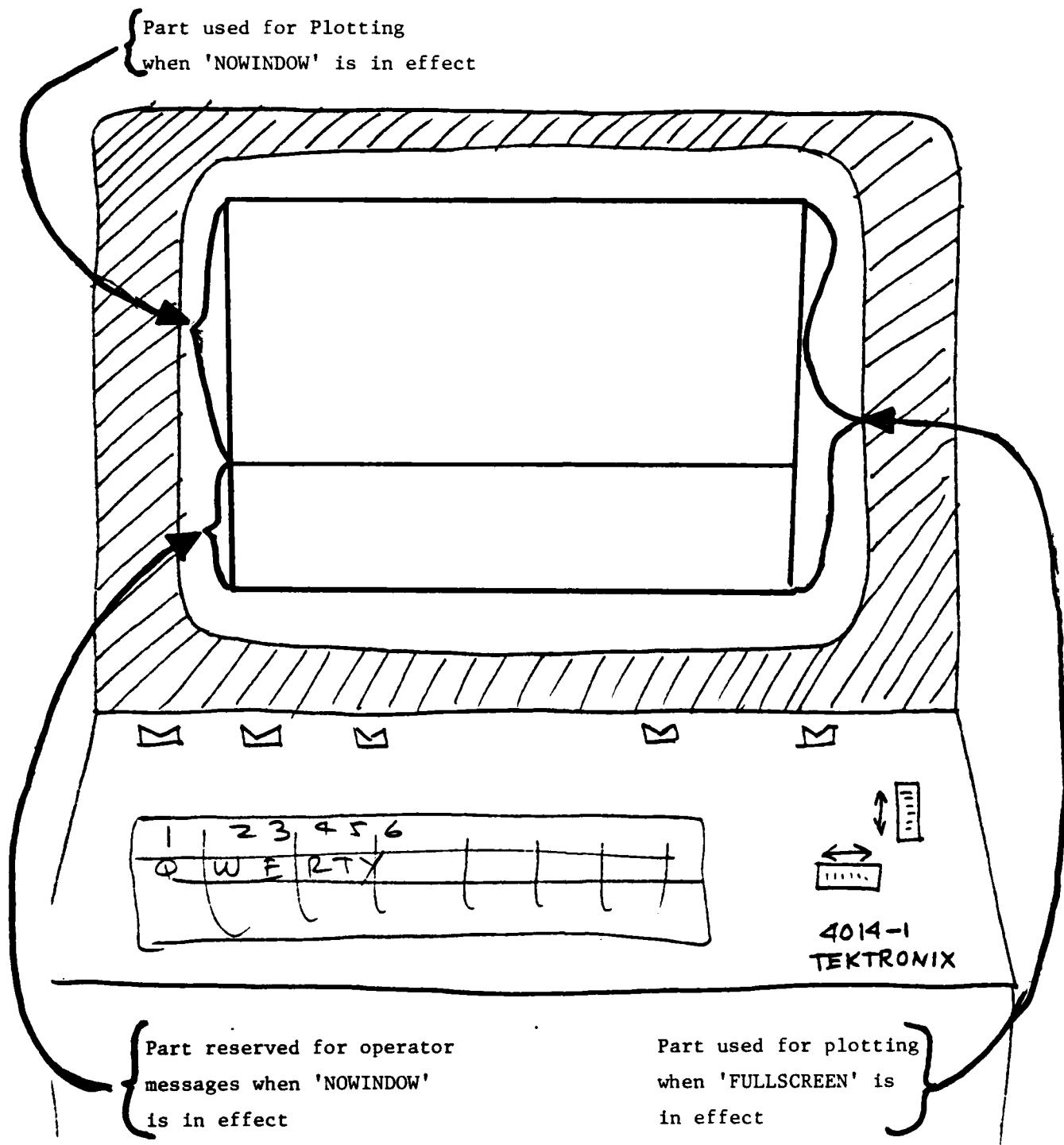
FIGURE 3-05: Graphic Relationships

(Page 2 of 6)

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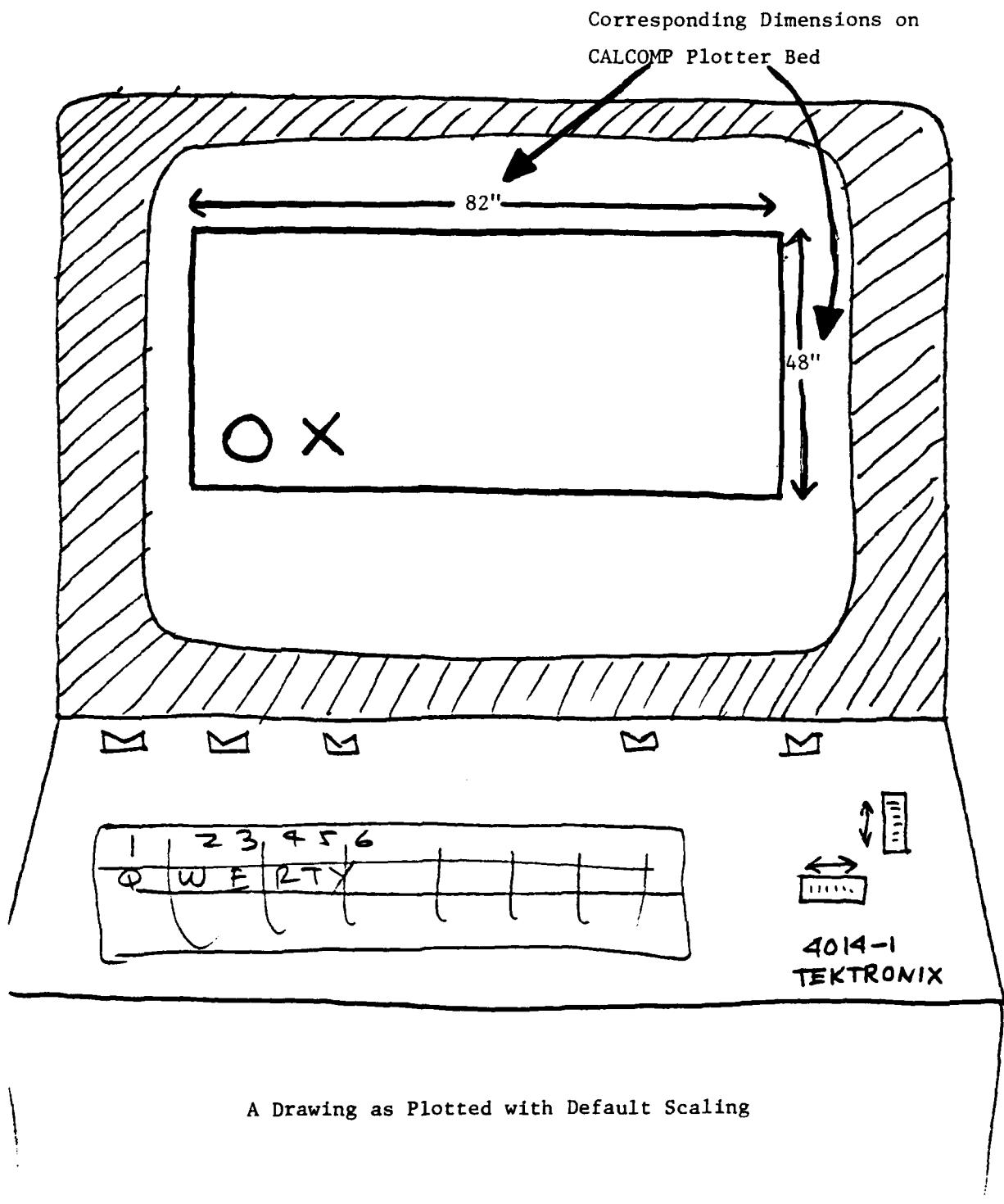
FIGURE 3-05: Graphic Relationships

(Page 3 of 6)

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Corresponding Dimensions on CALCOMP Plotter Bed Extend Outside CRT Face

82"

48"

4014-1
TEKTRONIX
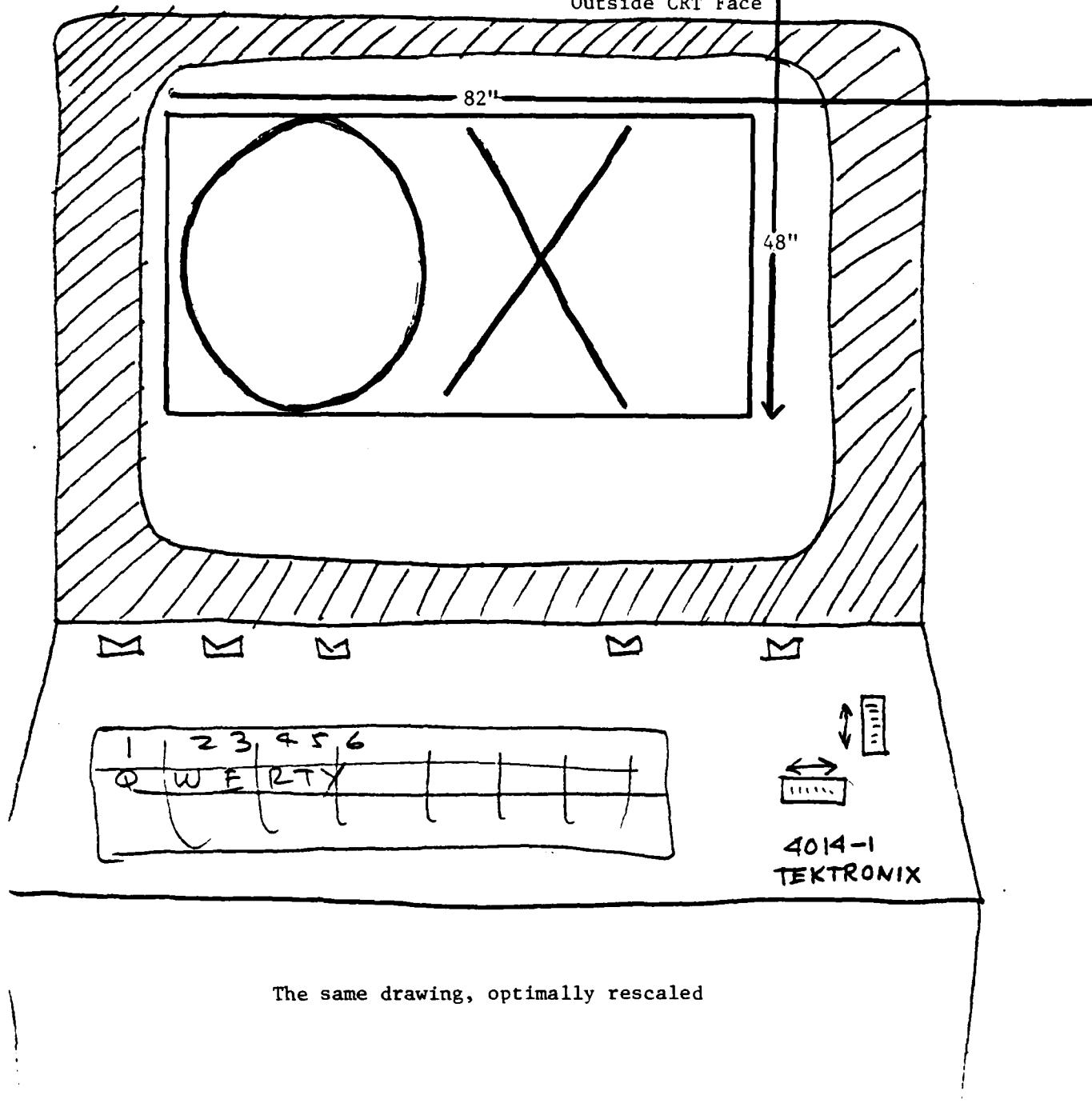
The same drawing, optimally rescaled

FIGURE 3-05: Graphic Relationships

(Page 4 of 6)

User-Selected CORNER 1

User-Selected CORNER 3

Box Completed by Program

User Employs the 'BOX' COMMAND.
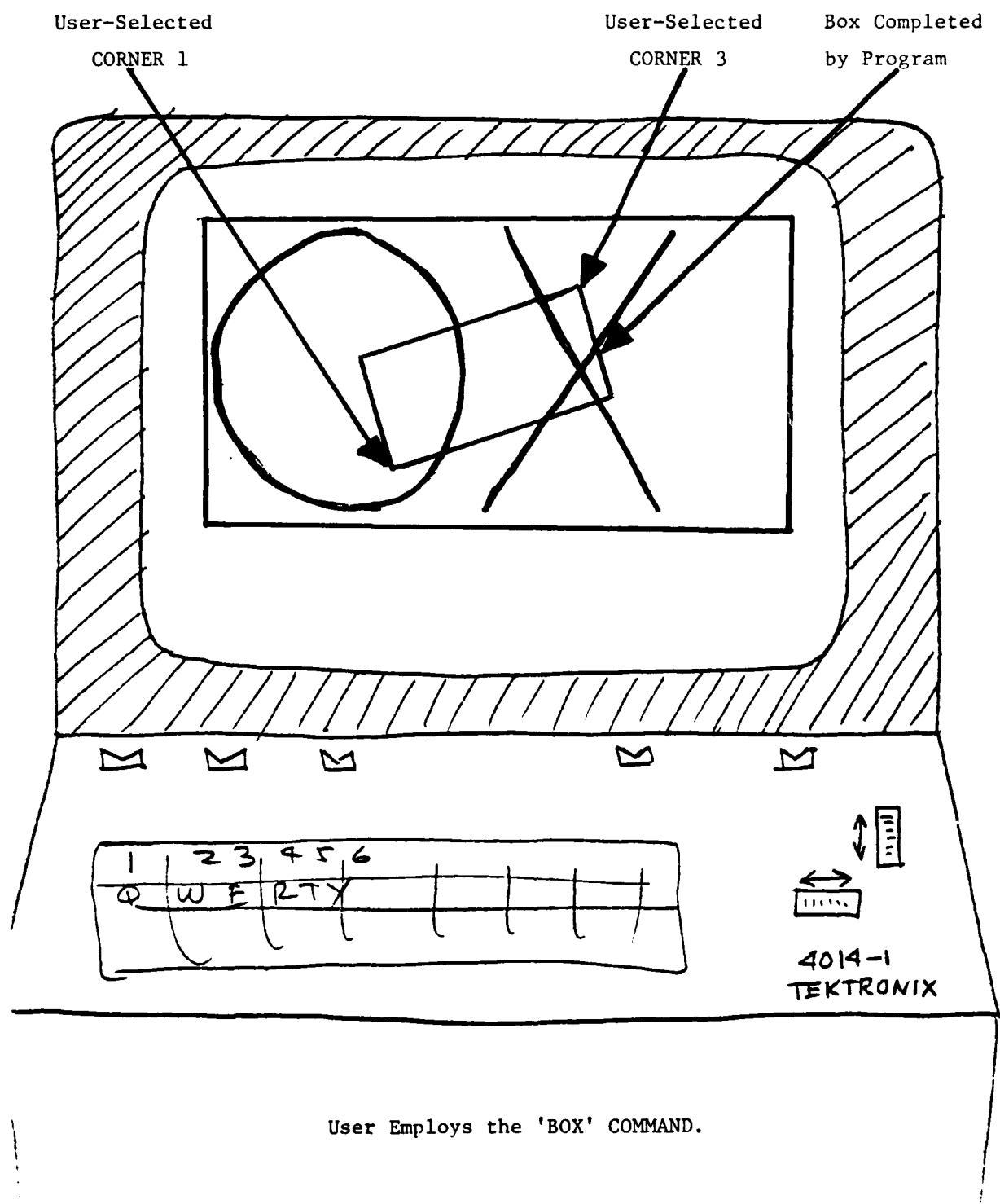
FIGURE 3-05:   Graphic Relationships

(Page 5 of 6)
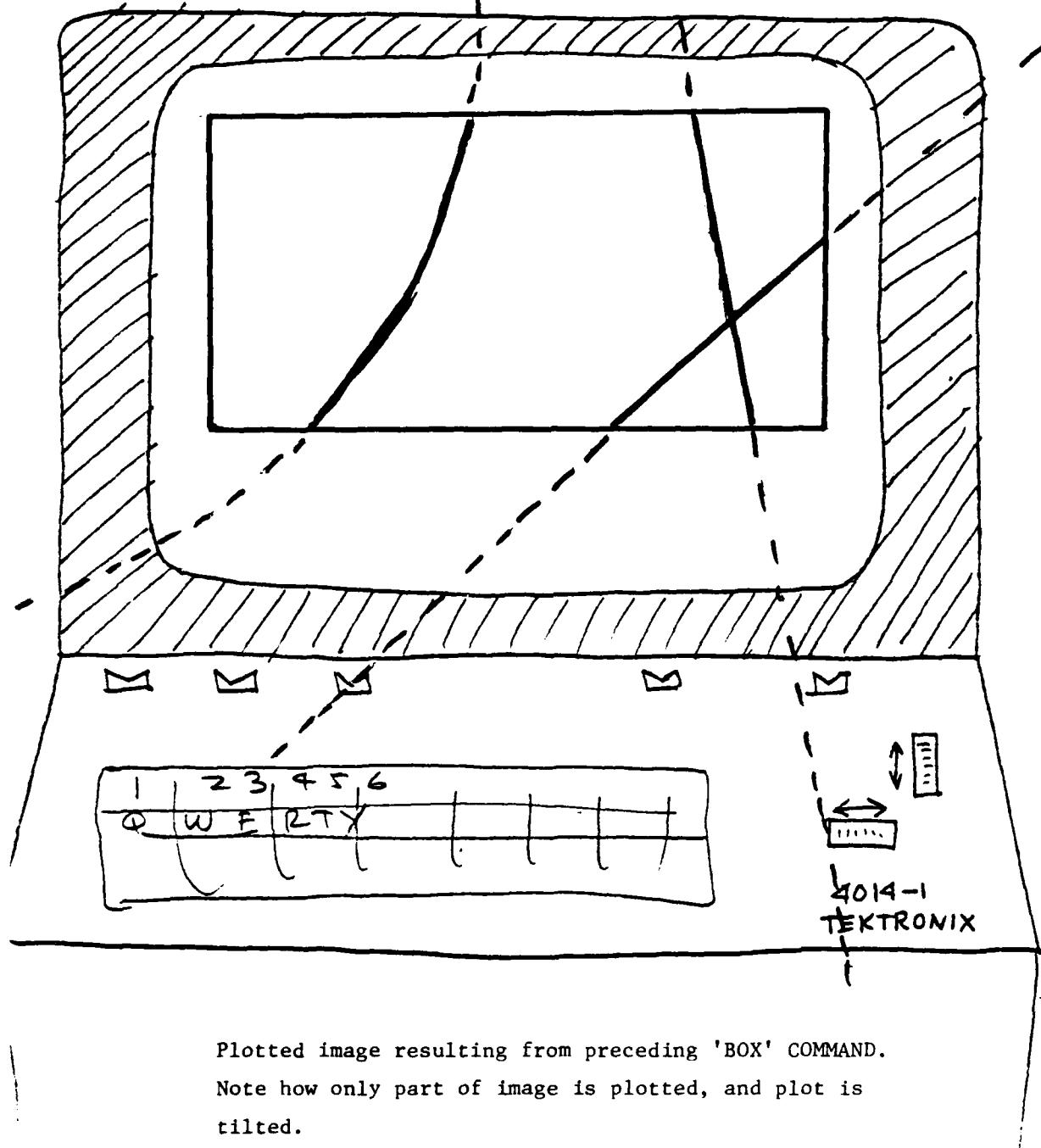
Plotted image resulting from preceding 'BOX' COMMAND.
Note how only part of image is plotted, and plot is
tilted.

FIGURE 3-05: Graphic Relationships

(Page 6 of o)

35

```
COMMAND?
help

THE AVAILABLE COMMANDS ARE 'PLOT','DUMP','HELP'
'SCALE','ROTATE','WINDOW','BOX','END','FAST',
'EXACT','FRAME','NOFRAME','NOWINDOW','HALT',
'NOHALT','REORIGIN',AND 'FULLSCREEN'. FOR MORE HELP, ENTER
'?' OR 'HELP' FOLLOWED BY THE COMMAND IN QUESTION.




COMMAND?
help window

WINDOW COMMAND:
FORMAT: WINDOW
THIS COMMAND SIMULATES THE CALCOMP WINDOW COMMAND. THE
PROGRAM WILL PROMPT FOR FOUR VALUES, X1,Y1,X2,Y2, IN TURN,
WHICH ARE THE X AND Y COORDINATES, IN INCHES, OF THE LOWER
LEFT HAND CORNER(1) AND THE UPPER RIGHT HAND CORNER(2), OF
THE DESIRED AREA. ANY FULLSCREEN AND ROTATE COMMANDS IN
EFFECT ARE APPLIED TO THE WINDOW THUS DEFINED, AND THE
PLOT IS SCALED TO FILL THE SCREEN AS WELL AS POSSIBLE
```

FIGURE 3-06: Examples of Entering HELP
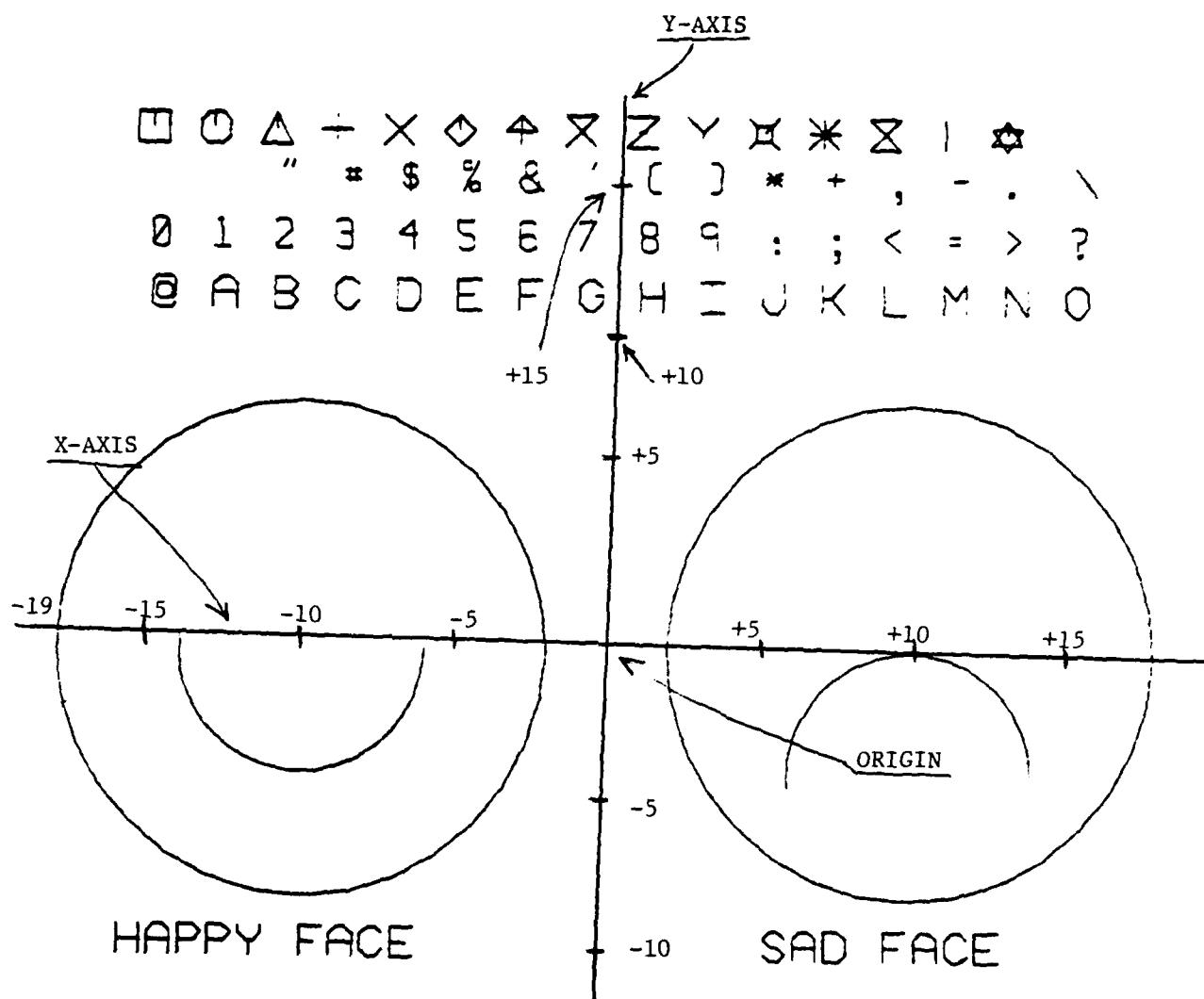
The coordinate system used to generate a representative sample plot. The coordinate system is expressed in inches, from the origin, which is in the center of the drawing. The CALCOMP user controls the location of the origin by application programs. See also Appendix A, pages A-32 through A-39, for the application of this data to the use of the WINDOW command.

FIGURE 3-07: Example CALCOMP Coordinate System

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APPENDIX A   Illustrative Plotting Session On The NASC AS/5

The following material shows a representative TSO session using the
CPS.   It illustrates the use and effect of most of the commands.   The
illustrations are images of the terminal CRT face made on the hard copy
unit.   For compactness, many of the illustrations show several steps
at a time.   Explanatory material is placed on the left page, and the
CRT display is shown on the right.

Note: The illustrations were made during development.   The files in
        these illustrations were developed for testing specific
        capabilities of the program in short runs, and are not actual
        production plot files.

The user executes the CALCOMP Preview System through use of the CLIST SCOPE. If the user does not have the data set SCOPE.CLIST in his catalogue, he can retrieve it from R831.LIBRARY via the LBGET command (abbreviated LBG). This example specifies the key word RON for read only.

The user executes CLIST SCOPE. This CLIST requires entering the full data set name of the file to be plotted. This CLIST allocates DDNAME FT30F001 to the requested plot file, DDNAMES FT05F001 and FT06F001 to the terminal and DDNAME FT08F001 for an output file to contain a dump of the plot file. The two DDNAMES allocated to the terminal are needed for the program.

When the program begins, it greets the user, and then prompts for a command.

The user reply "PLOT" causes the requested file to be plotted. The scale is such that the entire CALCOMP plotter bed is mapped into the CRT face.

A-02

```
READY
lbg scope ds('r831.library') clist ron
READY
exec scope 'm9033.scope.test1.data' list
FRA
OSJOB     SYS81086.T162751.RA000.M9033.SYSUT1        TSOUK3 FREED SUCESSF
ULLY
FILESTAT SCOPE.OUTLIST
CATALOG MANAGEMENT ERROR        8
FREE ATTRLIST(A)
FILE A NOT FREED, IS NOT ALLOCATED
ATTRIB A RECFM(U B S A) LRECL(137)
ALLOC DA(SCOPE.OUTLIST) SPACE(1 1) TRACKS USING(A)
ALLOC FI(FT08F001) DA(SCOPE.OUTLIST) OLD
ALLOC FI(FT30F001) DA('M9033.SCOPE.TEST1.DATA')   SHR
ALLOC FI(FT06F001) DA(*)
ALLOC FI(FT05F001) DA(*)
CALL 'SYS9.DCAFORT.LINKLIB(TEKTRONX)'

CALCOMP PREVIEW PROGRAM.
FOR MORE INFORMATION,REPLY '?' OR 'HELP.'
COMMAND?
plot
```

The plot of the requested file is listed on the next page. When plotting is completed, the screen cursor is displayed. The user can move the horizontal line to just below the bottom of the plot, to control the location of the prompts from the program. Then, he presses the RETURN key for subsequent program plots.

A-04

A-05

After the user presses the RETURN key, the program displays the words "FINAL HALT". Then, it prompts for the next command. The user enters "PLOT" in order to replot the same file at optimal scale. The resulting plot is shown on page A-09.

A-06

FINAL HALT
COMMAND?
plot

The requested file plotted optimally as a result of entering
"PLOT" in the illustration on page A-07.

234567890 "#$%&'

()*+,-./:;<=>?@_

ABCDEFGHIJKLMNOPQRST

UVWXYZ

5.00 10.00 15.00 20.00 25.00

40.00 80.00 120.00 160.00 200.00 240.00

A-09
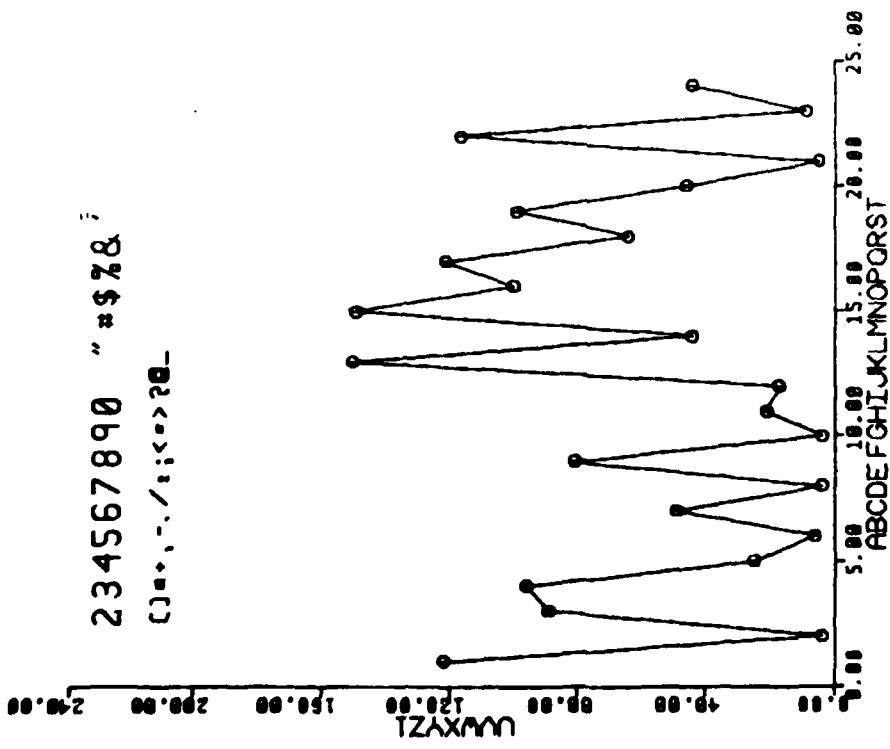
After the plot, the user presses the RETURN key. The program then displays the words "FINAL HALT" and prompts for the next command. In this case, the user wishes to place a box around a certain area by entering the BOX command. The program then displays the screen cursor that the user can move around to determine the corners of the area that is to be boxed.

234567890 "#$%&'

[]*+,-./:;<=>?@_

ABCDEFGHIJKLMNOPQRST

5.00   10.00   15.00   20.00   25.00

240.00   200.00   160.00   120.00   80.00   40.00

UUWXYZ1

FINAL HALT
COMMAND?
box

A-11
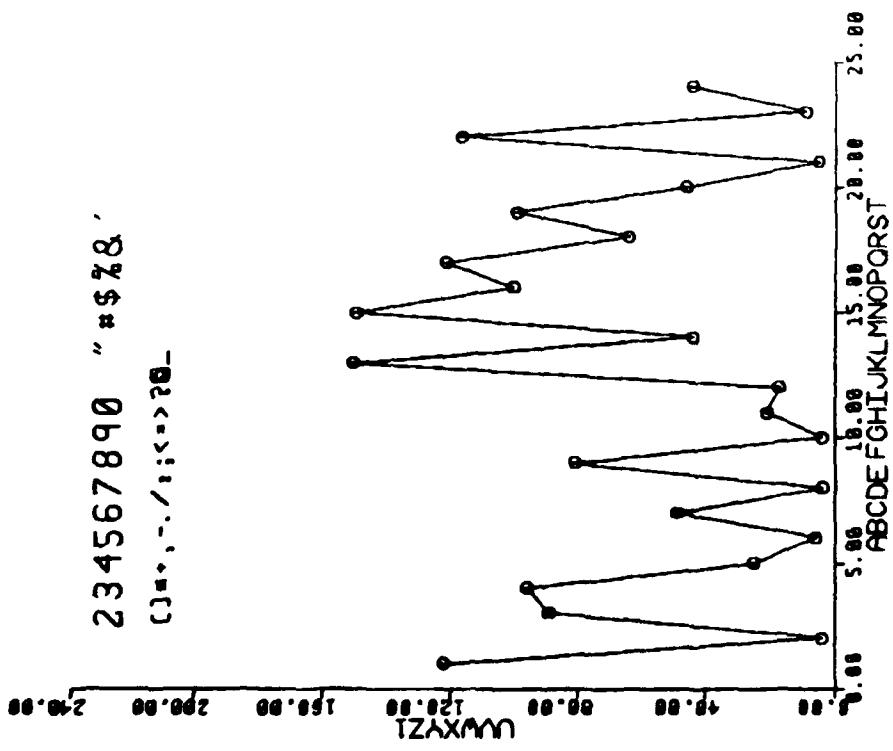
The user used the screen cursor to designate the lower left corner of the small rectangle as corner 1, and the upper left corner as corner 2. Cursor position is changed through use of the crosshair dials on the TEKTRONIX terminal. The sequence of actions was:

Program	User
Display cursor	Move screen cursor slightly to the right of the graph at point "200.00", Strike key containing the number 1, Press RETURN
Display cursor	Move screen cursor, Strike key containing the number 2, Press RETURN
Draw small rectangle Display cursor	Move cursor to bottom of screen, Press RETURN
Prompt 'COMMAND?'	Type 'PLOT'

In this example, the box is tilted since the user specified corner #2 to be slightly to the right and above corner #1.

After the box is displayed, the program prompts for the next command. The user types "PLOT". The result is a plot of the area enclosed within the box. The actual plot is shown on Page A-15.

A-12

2345678890 "#$%&'
()*+,-./:;<=>?@_

25.00
20.00
15.00
10.00
5.00
ABCDEFGHIJKLMNOPQRST

240.00
200.00
160.00
120.00
80.00
40.00
1.00
UUWXYZ1
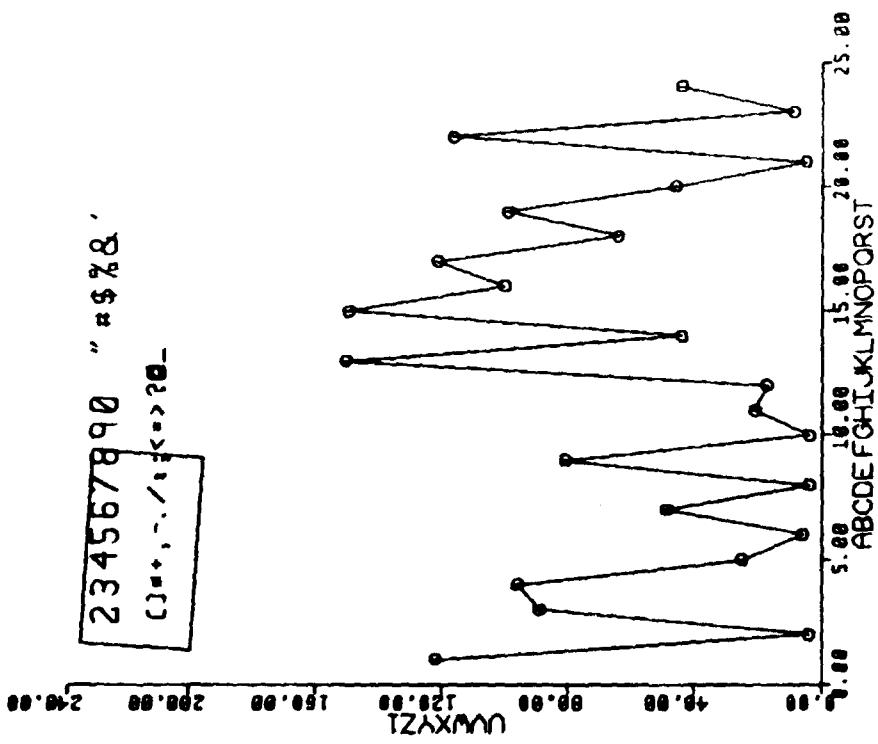
FINAL HALT
COMMAND?
box

COMMAND?
plot

A-13

When the user pressed RETURN, the program cleared the screen and plotted the file again, adjusting the plot so that the part enclosed in the small rectangle filled the plotting area. Note that since the user requested a box that was tilted to the right and downward, the actual plotted area seems to be tilted to the left and upward.

When the program reached the final halt, it displayed the screen cursor. The user entered the commands shown, i.e. REORIGIN and ROTATE 45. See Page A-17 for the resulting plot.

Note that after each plot, the scales are adjusted so that the next plot would be optimal.

A-14
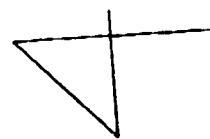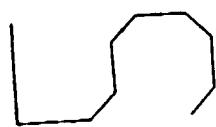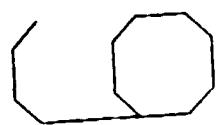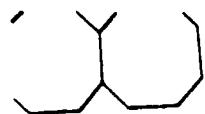
FINAL HALT
COMMAND? reorigin
COMMAND? rotate 45
COMMAND? plot

Because of the REORIGIN command, whenever the program encountered a temporary halt code, it displayed the screen cursor. The user moved the origin of coordinates to the right, so that the rotated plot could be displayed. (The origin of the CALCOMP plot is also the origin in the plotted graph.)

The two commands that were entered after the COMMAND prompt did the following:

   a. Caused the program to ignore temporary halt codes.

   b. Caused the program to use the entire screen for plotting.

The resulting plot is listed on Page A-19.

A-16
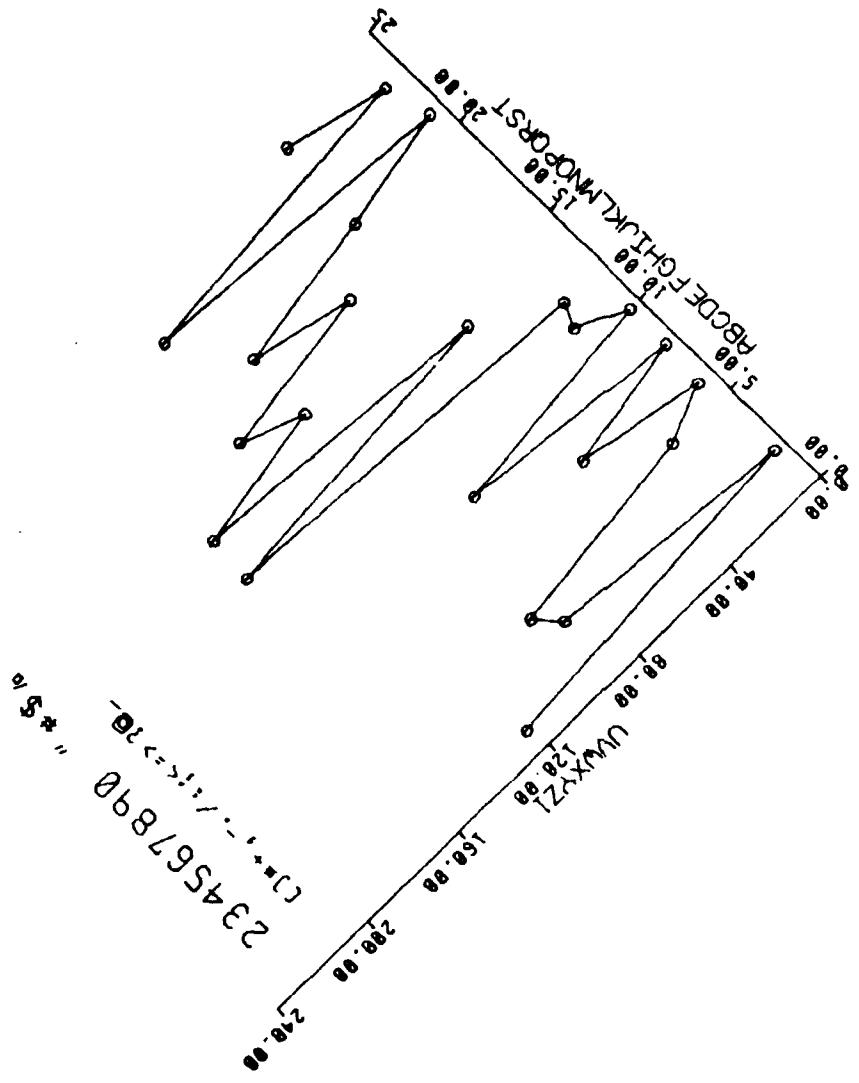
FINAL HALT
COMMAND?
nohalt
COMMAND?
fullscreen
COMMAND?
plot

A-17

The file is now plotted so that the vertical extent of the plotting area on the CRT face corresponds to the entire vertical extent of the CALCOMP plotter bed. Note, the file is not plotted optimally but only increased by the proportion of the entire vertical extent to the vertical extent without the operator messages area.

After the plot, the user moved the screen cursor above the plot for ease of reading and entered RETURN. The program typed "FINAL HALT" and prompted for the next command. The user then typed "PLOT" in order to see the file, with the full screen option, plotted optimally.

See Page A-21 for this plot.

FINAL HALT
COMMAND?
plot

The file, with the fullscreen option, plotted optimally.

A-20

2345678900 " # $ % & '
[ ] * + , - . / ; ; < = > ? @ _

A--21
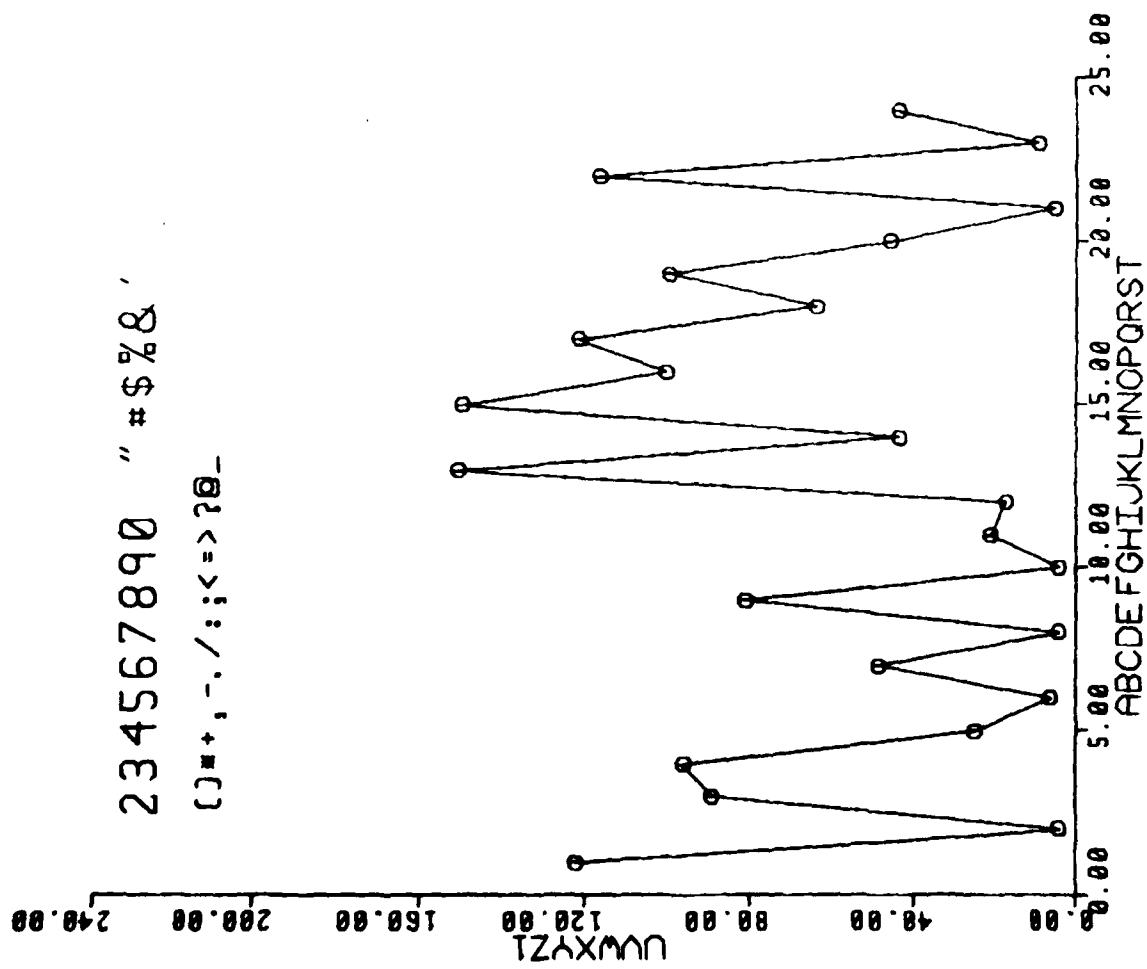
How to exit from the CPS program. After entering "END", CLIST SCOPE asks if the user wishes to print a file dump. The response was "NO", in this case. "YES" is generally only entered, if the user entered "DUMP" while running the CPS.

A-22

DELETE SCOPE.OUTLIST
ENTRY (A) M9033.SCOPE.OUTLIST DELETED

FRA
FT30F001 M9033.SCOPE.TEST1.DATA
TSOWK4 FREED SUCESSF

ULLY
READY

234567890 "#$%&'
()*+,-./;;<=>?@_
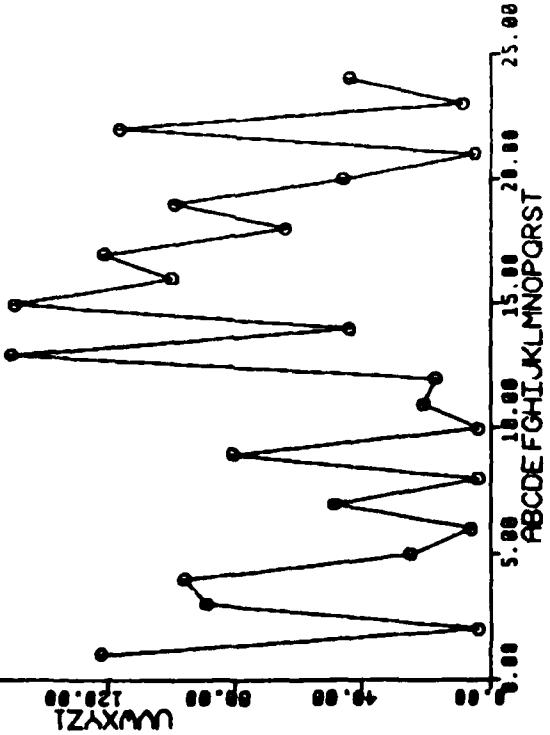
FINAL HALT
COMMAND?
end
DO YOU WISH TO PRINT A FILE DUMP?--ENTER YES OR NO.
no

The user decides to plot another file.

A-24

```
exec scope 'm9033.scope.circle.data'
CATALOG MANAGEMENT ERROR    8
FILE A NOT FREED, IS NOT ALLOCATED

CALCOMP PREVIEW PROGRAM.
FOR MORE INFORMATION,REPLY '?' OR 'HELP.'
COMMAND?
plot
```

The requested file is plotted. After the plot, the user enters "PLOT" again, so he can see the file plotted optimally.
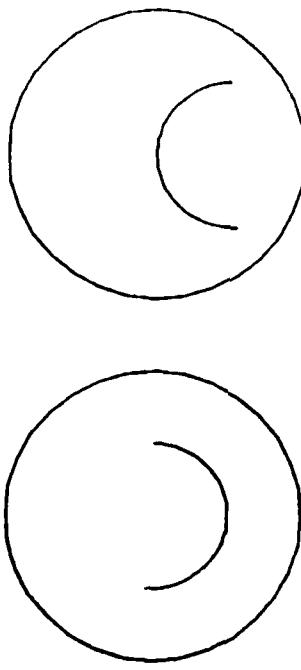
SAD FACE

HAPPY FACE

FINAL HALT
COMMAND?
plot

A-27

The same file plotted optimally. After final halt, the user requested
that a frame and window data be displayed.

A-28
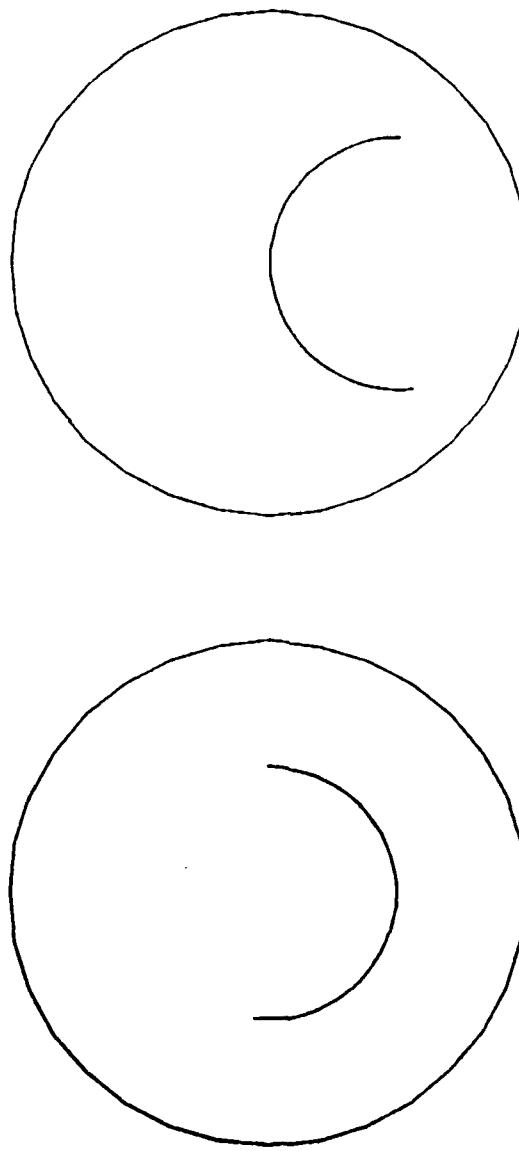
HAPPY FACE

SAD FACE

FINAL HALT
COMMAND?
frame
COMMAND?
plot

A-29
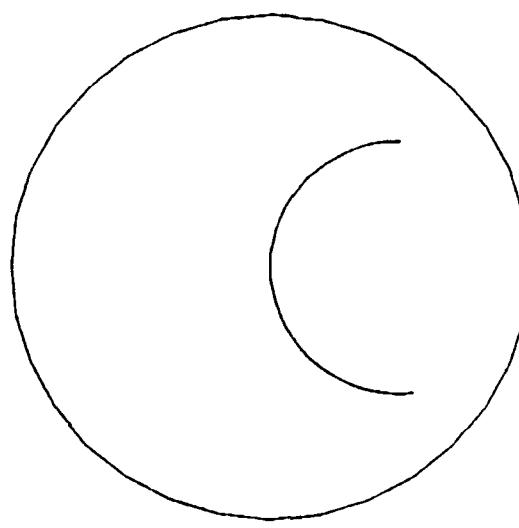
This is the frame outlining the plotting area, with the window data displayed below. These are the values of the X1, Y1, X2, and Y2 coordinates that would be necessary to get the same plot on the CALCOMP plotter (or the TEKTRONIX scope with this program).

Note, the values of X1 and Y1 are the coordinates of the lower left hand corner of the plot. The values X2 and Y2 are the coordinates of the upper right hand corner. The program computes these values from the CALCOMP units specified in the CALCOMP sentences in the requested file in terms of inches on the CALCOMP plotter but scaled optimally for the TEKTRONIX terminal.

A-30

WINDOW DATA:
X1 = -17.999969 Y1 = -9.999862
X2 = 28.979233 Y2 = 17.499924
SCALE = 0.174546E+01
PRESS RETURN TO BEGIN PLOT

The plot of the requested file with a frame.

A-32

HAPPY FACE

SAD FACE
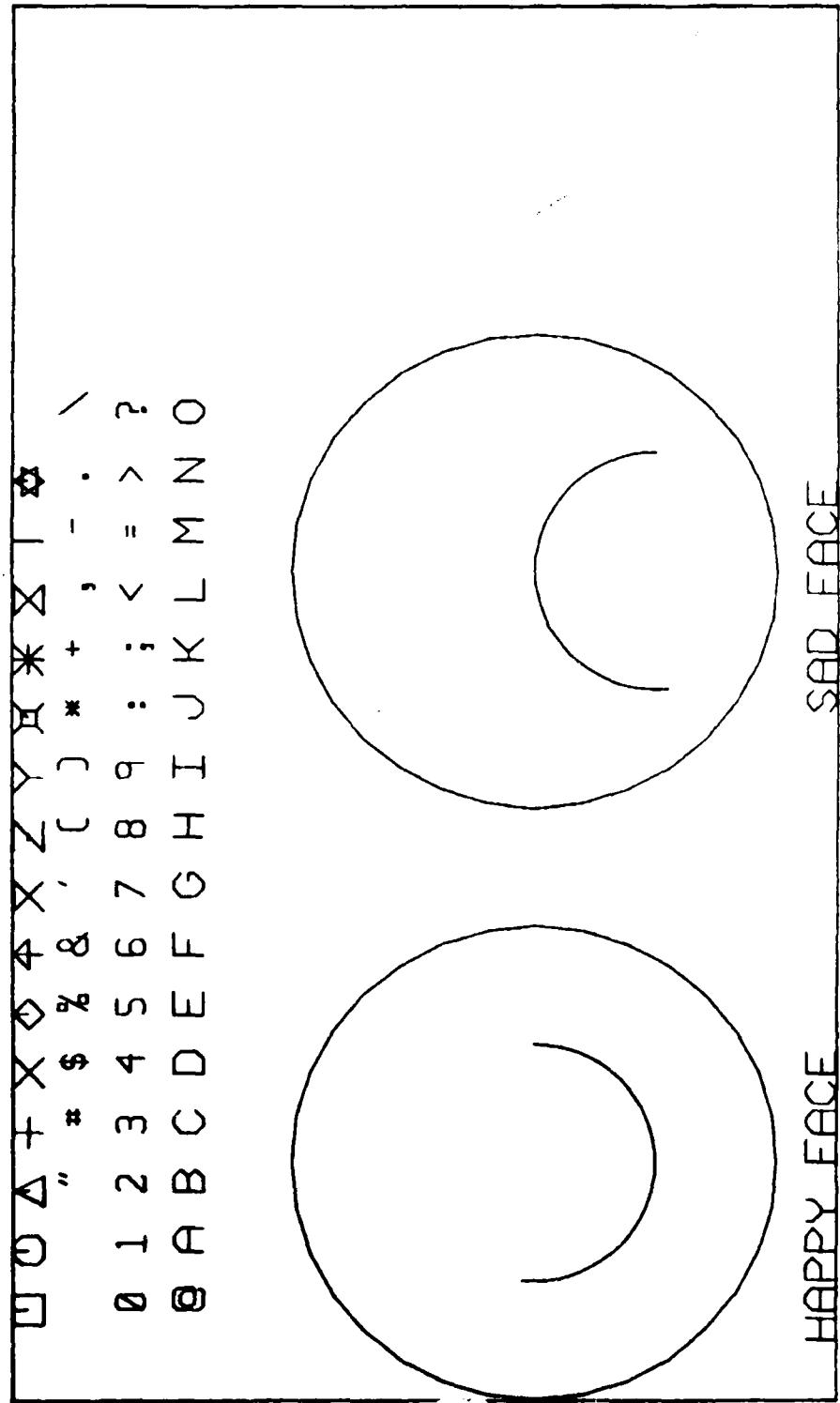
FINAL HALT
COMMAND?

The user cleared the screen using the reset key on the graphics terminal, and then wished to enter window values so that only the upper right hand section of the plot is to be displayed.

A-34

```
window
X1 =?
0
Y1 =?
0
X2 =?
29
Y2 =?
18
COMMAND?
plot
```

Requested window values being displayed.

A-36

WINDOW DATA:
X1 =   0.000020 Y1 =   -0.000011
X2 =   28.999985 Y2 =   18.000015
SCALE = 0.266773E+01
PRESS RETURN TO BEGIN PLOT

The actual plot. Upon the conclusion of this plot, the user entered "end" to return to TSO control.

A-38

FINAL HALT
COMMAND?
end
READY

The user specifies that he wishes to plot another file.

A-40

```
exec scope 'm9033.scope.heart.data'
CATALOG MANAGEMENT ERROR      8
FILE A NOT FREED, IS NOT ALLOCATED

CALCOMP PREVIEW PROGRAM.
FOR MORE INFORMATION,REPLY '?' OR 'HELP.'
COMMAND?
plot
```

After final halt, the user requested the smooth approximation to the curves, which were previously plotted as line segments joining the given points. The plot has been rescaled for an optimal display.

There are two operator messages below the plot. When the program encounters an operator message, it displays it below the plot area, and halts, displaying the screen cursor. The operator messages are preceded by three asterisks, to distinguish them from other prompts, just as on the CALCOMP plotter.

A-42

COMMAND?
plot

CAL
WUVS
TEK
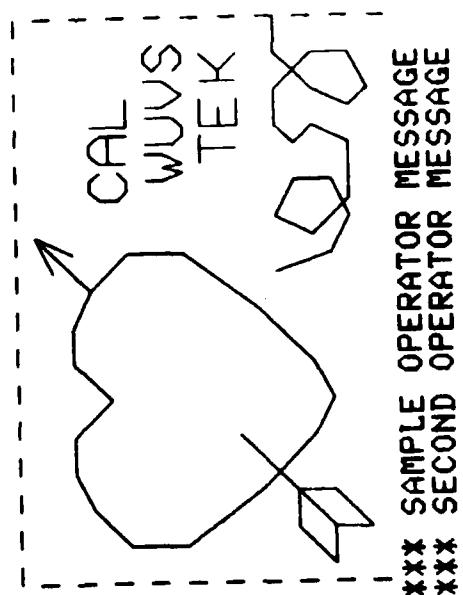
*** SAMPLE OPERATOR MESSAGE
*** SECOND OPERATOR MESSAGE

FINAL HALT
COMMAND?
exact

A-43

Following this plot, the user entered "END" to end plotting.

APPENDIX B.   Illustrative Plotting Session on The PDP-11 RSX-11M+

The following material show features of the CPS unique to the PDP-11.   The
illustrations are images of the terminal CRT face made on the hard copy
unit.   As in Appendix A, the explanatory material is placed on the left
page, and the CRT display is shown on the right.

After mounting the tape containing CALCOMP data on the tape drive, the user types in the RSX-11M commands to allocate the tape drive and to mount the tape before running the CPS.

When the program begins, it greets the user, and then prompts for a command.

The user reply "PLOT" causes the program to prompt for the logical unit number of the file to be plotted. In this case, the user enters "30", causing FILE30.DAT to be plotted.

B-02

```
>ALLOC MM0:
>MOUNT MM0: 90010
>RUN [50,55]CLTOTK

CALCOMP PREVIEW PROGRAM.
FOR MORE INFORMATION,REPLY '?' OR 'HELP.'
COMMAND?
PLOT
ENTER FILE IDENTIFIER AS AN INTEGER
BETWEEN 0 AND 99.
30
FILENAME ACCESSED WILL BE: FILE30.DAT
```

B-03

When plotting is completed the screen cursor is displayed. The user moves the horizontal line to just below the bottom of the plot, to control the location of the prompts from the program.

B-04

B-05

After the user pressed the RETURN key, the program prompted; the user replies caused the program to replot the same file, at optimal scale.

B-06

FINAL HALT
COMMAND?
PLOT
ENTER FILE IDENTIFIER AS AN INTEGER
BETWEEN 0 AND 99.
30

The same file plotted optimally.

B-08

234567890 "#$%&'

()*+,-./:;<=>?@_

ABCDEFGHIJKLMNOPQRST

UUWXYZT

0.00   5.00   10.00   15.00   20.00   25.00

0.00   40.00   80.00   120.00   160.00   200.00   240.00
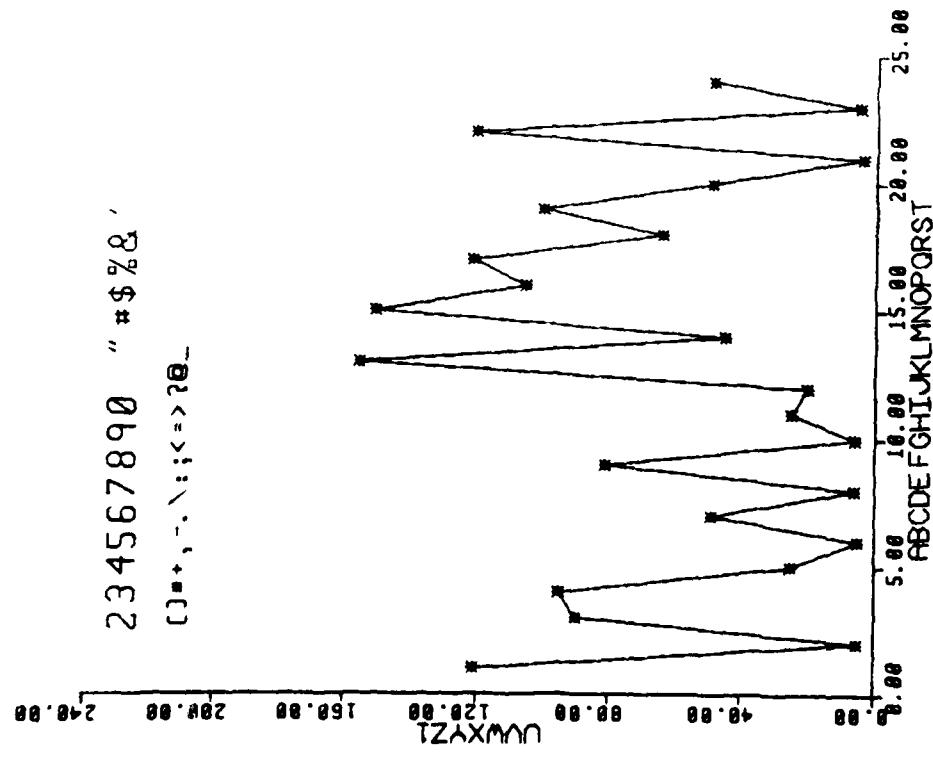
The user now requests to plot a different file, i.e., FILE21.DAT. This file is contained on disk. Since the previous file was contained on tape, the program searches the tape for the file. Since FILE21.DAT is not on tape, the program displays an appropriate message. This message says that requested file is not on tape; therefore, the program will search on disk. This file is found on disk.

PLOT
ENTER FILE IDENTIFIER AS AN INTEGER
BETWEEN 0 AND 99.
21
FILENAME ACCESSED WILL BE: FILE21.DAT

TT22 -- ERROR 29
FCS: -26, 0 30 FILE21.DAT
   in "GETFIL" at 26
   from "FETCH " at 97
   from ".MAIN." at 207

COULD NOT FIND FILE ON TAPE.
WILL SEARCH ON DISK

234567890 " #$%&'
. ()=+,-. \:;<=>?@_
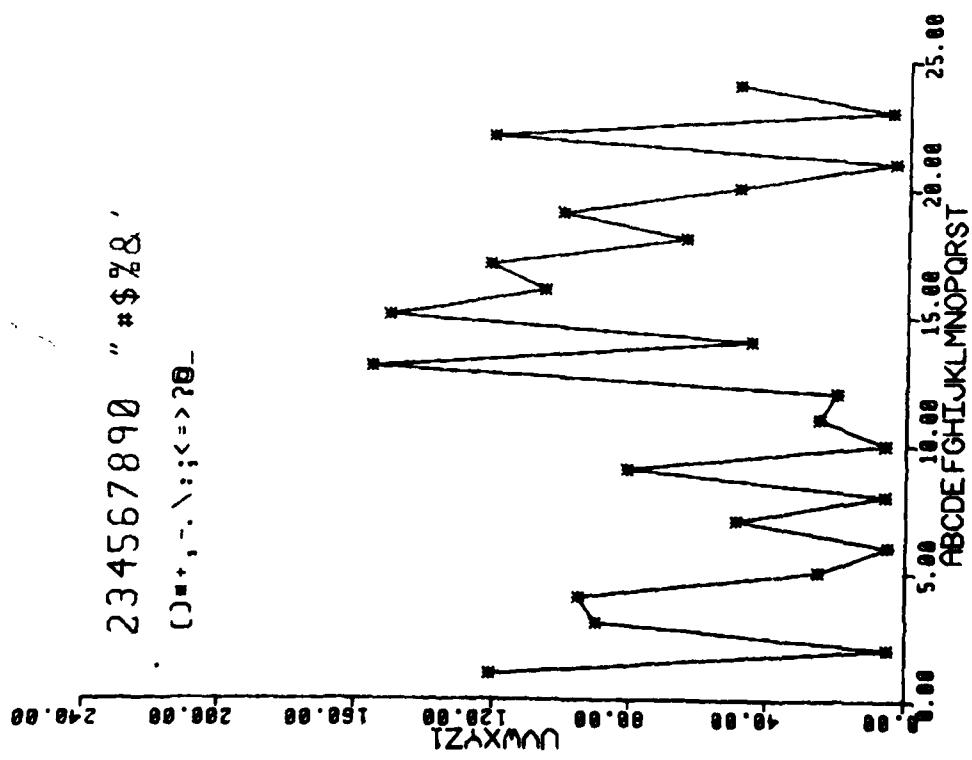
> FINAL HALT
COMMAND?

Contents of new file plotted optimally. Upon completion of plot, user decided to exit from the CPS.

B-12
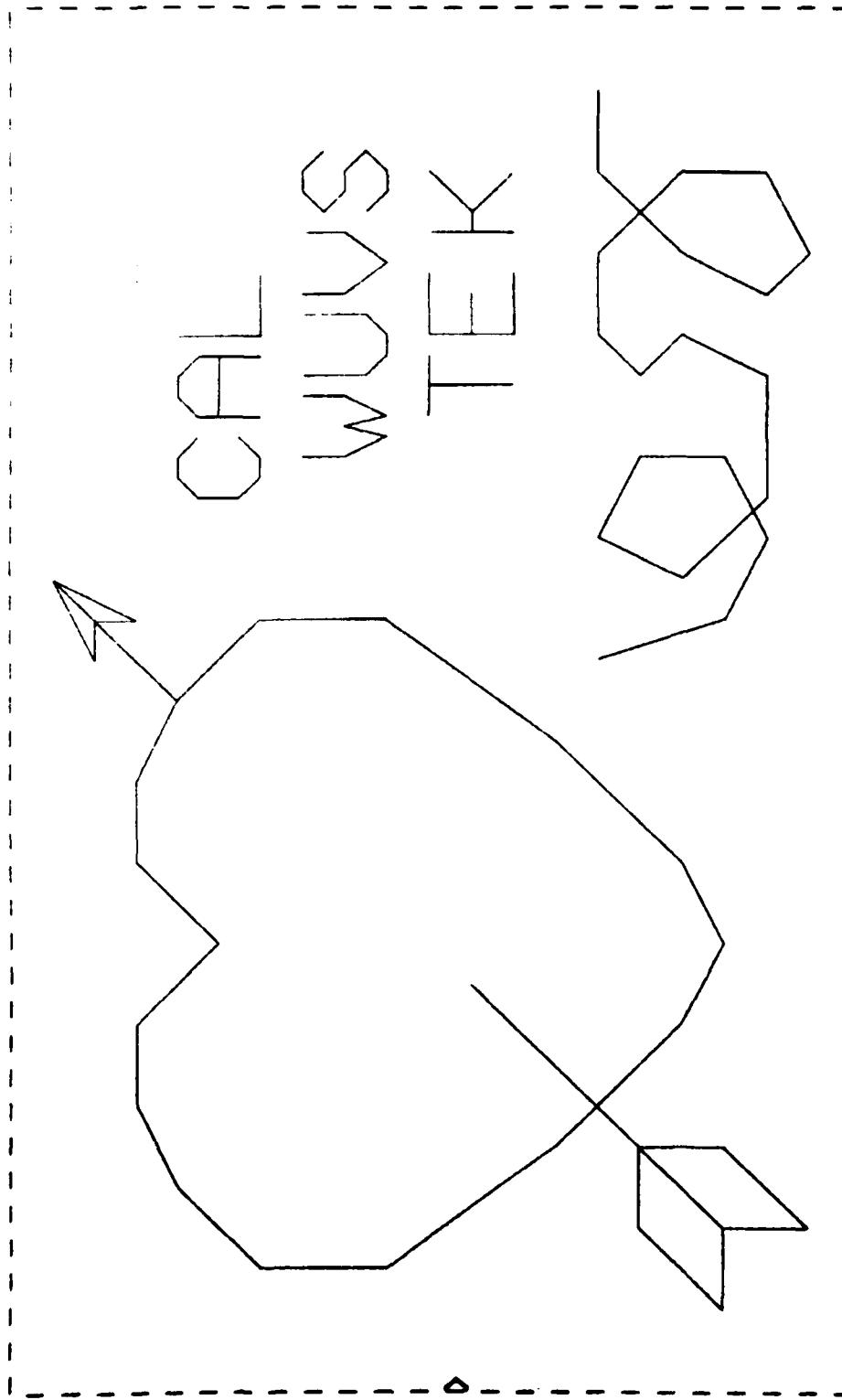
*** PDP-11 VERSION OF CALCOMP PROGRAM.
*** DEMONSTRATING OPERATOR MESSAGES.

B-13

DATE
ILMED
-8